

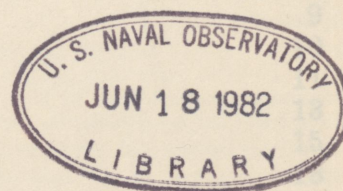
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C I R C U L A R N O. 1 6 5

U. S. Naval Observatory, Washington, D. C. 20390

June 1, 1982



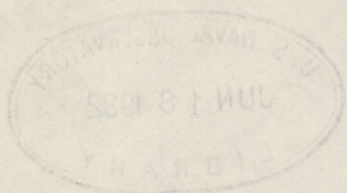
TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

by

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and

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It is a continuing policy of the Nautical Almanac Office to prepare issues of the series of Naval Observatory *Circulars* containing detailed information for observing most total solar eclipses and some annular solar eclipses. This is a service to the international scientific community, based on agreements with Commissions and Working Groups of the International Astronomical Union.

The target date for distribution is one year in advance of the event. The distribution is done by the staff of the Nautical Almanac Office. As a regular publication of the Naval Observatory, distribution is made to institutions with which the Observatory has exchange agreements or other obligation. No other mailing list or request file is maintained. Users must make a new written request for each eclipse *Circular*, no more than 12–14 months in advance. There is no charge for a single copy; bulk rates will be quoted upon written request to the Director of the Nautical Almanac Office.

The content and layout of the eclipse *Circulars* is being reviewed and revised. Users' comments are solicited, on useful features to be continued as well as suggestions for changes or additions.

It is permissible to reproduce any portion of this *Circular*, except for any material noted as having been published elsewhere or prepared by someone who is not a staff member of the Naval Observatory. It is requested that when any information herein is used for any purpose that an appropriate acknowledgment of the source be made.

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USNO Circular 165 Erratum and Addenda

On page 8, Elements of the Eclipse,

for "Ascension of Moon" read "Right Ascension of Moon",
after Declination of Moon, for "+23" read "+22".

On page 19, add at bottom of page:

LIMIT -168 30.9 -17 29.4 -168 20.1 -18 05.0 -168 09.4 -18 40.8

GENERAL INFORMATION

A total eclipse of the Sun will occur on Saturday, 11 June 1983. It will be followed by an associated partial eclipse of the Moon on 25 June 1983. The total solar eclipse will be of quite long duration, exceeding five minutes at maximum, and that portion of the path will lie in a populated land area with good weather prospects.

The last preceding total eclipse of the Sun was on 31 July 1981, when the path crossed the U.S.S.R. from the Black Sea to Sakhalin. The next total eclipse of the Sun will occur on 22-23 November 1984, when the path will also cross eastern Indonesia and Papua New Guinea. The paths of the total eclipses of 1983 and 1984 intersect in the Gulf of Papua west of Port Moresby, which is in both paths. There will also be annular eclipses of the Sun on 4 December 1983 across central Africa, and on 30 May 1984 across Mexico and the southeastern United States. Both eclipses in 1984 will have narrow paths and be of short duration. The last preceding eclipse in the same saros as the 1983 eclipse was a total eclipse of over five minutes maximum duration on 30 May 1965 in the south Pacific Ocean. The next following eclipse in the saros will be a total eclipse of just under five minutes maximum duration on 21 June 2001, across southern Africa. That will be the first total eclipse of the Sun in the next millenium. The next total solar eclipse of long duration will occur on 11 July 1991, across Hawaii and Mexico, when duration at maximum will approach seven minutes.

The total eclipse of the Sun in 1983 will occur just a few days before northern solstice. The Sun will be in the midst of several bright constellations: Gemini to the east; Taurus, with Aldebaran, the Hyades, and the Pleiades to the west; Capella in Auriga to the north; Betelgeuse in Orion to the south, nearly overhead for observers in the path of totality. The Milky Way will run from Capella to Betelgeuse. Venus will be near greatest eastern elongation of 45 degrees, apparent magnitude -3.9; Mercury near greatest western elongation of 24 degrees, apparent magnitude +0.6; Mars just 2 degrees west of the Sun, apparent magnitude +1.7.

PATH AND VISIBILITY. The portion of the path over land will lie mostly in Indonesia. At approximately 03h 12m U.T. on 11 June 1983, the center of the umbra of the Moon's shadow will first touch the Earth at sunrise in the south Indian Ocean, beginning the path of total phase. The path will be approximately 130 km wide, and the duration of totality will be approximately 2m 14s. Proceeding northeastward across the Indian Ocean, first landfall will occur about one hour later on Christmas Island. By then, maximum duration at the center line will be just under 5 minutes. The path will sweep across Java just before local noon, from about 04h 22m U.T. to 04h 41m U.T., the width growing from 195 to 202 km, the duration at the center line from 5m 2s to 5m 15s. Maximum will be reached at approximately 04h 47m U.T., over water between Java and Sulawesi, when the duration may reach 5m 15.6s. The Sun will be well up for observation, at altitude 60 degrees. Several large cities lie in the path in Java, but not the Bosscha Observatory. The path will continue on over the island Sulawesi (Celebes), where Ujung Pandung (Makassar) lies nearly on the center line at 05h 00m U.T., and the duration will be approximately 5m 12s. Passing over a number of smaller islands, the path will reach West Irian at approximately 05h 50m U.T., cross into Papua New Guinea at 05h 54m U.T., and off over open water at 06h 07m U.T. Port Moresby will lie nearly on the central line at 06h 03m U.T. By that time, the duration at center will have decreased to 3m 21s. It will be late afternoon, and the altitude of the Sun will be about 20 degrees. The umbra will leave the surface of the Earth at sunset at the island Efate in New Hebrides. There the duration will be 2m 22s on the center line, and the path width about 135 km.

Partial phases of the eclipse, of magnitude decreasing with the distance from the path of total phase, will be visible over Sri Lanka, southeastern Asian mainland, the Philippines, and Australia.

CHANGE IN CONTENTS. The type of information presented in this *Circular* has been changed from that of the past few years, in an effort to satisfy the needs of more observers. The path at medium and high altitudes as a function of time is no longer given. Instead, the path on the surface and the central line at aircraft altitudes is given as a function of longitude for those who wish to chart on their own maps. Linear interpolation for intervening longitudes or altitudes is sufficient, and the duration at flying altitudes is essentially the same as at the surface for this eclipse.

A more comprehensive weather description than usual has been provided by Mr. Jay Anderson, Winnipeg; an easy-to-use graph for limb corrections has been provided by Mr. David Herald, Canberra.

PARAMETERS. The predictions in this *Circular* are derived from the solar and lunar data contained in a new ephemeris developed jointly by the Jet Propulsion Laboratory and the U. S. Naval Observatory for use in the *Astronomical Almanac for 1984* and after. The arguments are in Universal Time (U.T.), using $\Delta T = +53^s.61$ as the best prediction in February 1982. Other preliminary publications, and the maps in this *Circular*, were based on the old system; however, the change in the predicted location of the path is less than one kilometer.

DEFINITIONS OF TERMS.

Time arguments are Universal Time, as described above.

Longitudes are negative east of Greenwich, positive west of Greenwich.

First and fourth contacts are, respectively, the beginning and the end of the partial phase. *Second and third contacts* are, respectively, the beginning and the end of the total phase, if it occurs at the location given. *Duration* is the time interval between second and third contacts. Dot leaders indicate that a phenomenon occurs below the horizon for the given location.

The *position angle* of a point of contact on the solar limb is measured eastward (counterclockwise) around the solar limb. *P* is the position angle measured from the north point of the limb; *V* is the position angle measured from the vertex point. The north point lies on the great circle arc drawn from the north celestial pole to the center of the solar disk; the vertex lies on the great circle arc drawn from the zenith to the center of the solar disk. If the angle is listed as negative, you may add 360 degrees.

The *azimuth* of the Sun is measured along the horizon clockwise from the north point eastward to the foot of the great circle arc drawn from the zenith through the center of the solar disk down to the horizon. If it is listed as negative, either add 360 or measure westward from north.

The *magnitude* of the eclipse is by definition the fraction of the apparent diameter of the solar disk covered by the Moon at the time of greatest phase, expressed in units of the solar diameter. For partial phase at maximum eclipse (no totality), the magnitude is less than 1. For total phase at maximum eclipse, the magnitude is the diameter of the Moon's disk in units of the solar diameter.

Degree of *obscuration*, prepared especially for this *Circular*, is the fraction (per cent) of the area of the apparent solar disk obscured by the Moon at maximum eclipse. Numerically, it is always less than the magnitude. For a few points near the edge of the path of totality, rounding and neglect of altitude may indicate total obscuration for points predicted to be outside the path.

Inexperienced observers are cautioned that at anything less than total obscuration, even 99%, the Sun should not be observed directly without safe filters containing metal. A projected image is preferable.

LOCAL CIRCUMSTANCES. A table of accurate local circumstances for a list of geographic locations is provided in this *Circular*. They are tabulated approximately by country, for a variety of locations in the path, and major cities and observatories which should see partial phases. For locations on the detail maps, coordinates were read from the maps and calculations carried out assuming mean sea level. An elevation of several hundred meters could change the times by as much as a second and shift the path a few hundred meters. The printed circumstances correspond to the printed coordinates, in case there should be an error in identification or coordinates. It is often difficult in preparing maps and local circumstances to ascertain the correct name and spelling, or even the correct nation, for a given location. Therefore, the information presented here is for location purposes only, is not authoritative, and does not imply official recognition of the status of any area by the United States government.

For the user who wishes to calculate his own local circumstances, the elements of conjunction, general circumstances, and Besselian Elements for Universal Time arguments (based on the new ephemerides, no correction to lunar latitude) are presented. The Besselian Elements are given as usual in tabular form, and also in polynomial form, courtesy of Dr. L. E. Doggett. Precepts for the calculations of local circumstances may be found in the Explanation of any recent *Astronomical Almanac*.

ESTIMATING LOCAL CIRCUMSTANCES

CONTACT TIMES. Beginning and end of the partial phase, or first and last contacts, can be estimated using the one-page overall map reproduced from the *Astronomical Almanac*. The dashed lines show the surface outline of the Moon's penumbra at a time interval of 30 minutes. The short dashes show the leading edge, the long dashes show the trailing edge. First contact occurs when the leading edge passes over the location in question, last contact occurs when the trailing edge passes. Duration is the time difference between contacts. The time halfway between is the middle of the eclipse. This is near the time of maximum eclipse, but not necessarily identical. At a given location, one need only estimate the intermediate position of the penumbra's edge between the starting and ending lines on either side and thus the time of the contact. For observers within the elongated teardrop curves to the extreme east and west, part of the eclipse occurs below the horizon.

Low precision times of second and third contacts in the path of totality can also be estimated. The path of total phase over land is shown on a series of detail maps in the last part of this *Circular*. A few pages before the maps is a table of Local Circumstances for Points on the Central Line. On the maps, the heavy solid lines mark the northern and southern limits and central line of the predicted path. Each dashed line represents the projection of the diameter of the umbra, joining the northern and southern limits and central point for the indicated instant—at which all points on the dashed line observe maximum eclipse.

Use the maps and the table as follows: Find on the maps the location in the path for which you want local circumstances. Through this point draw a line across the path parallel to the dashed lines. Mark the point where this line intersects the central line. Measure the length (m_1) of the segment of the central line between the preceding and following minute points. Measure the length (m_2) of the central line between the preceding minute point and the line you drew in. The ratio (m_2/m_1) gives the fraction of a minute to be added to the preceding time, thus giving the time of maximum eclipse for the selected location. Call this time t_0 . Now turn to the Table of Local Circumstances for Points on the Central Line. In the first column on the left hand page, find the two lines whose times bracket t_0 . Using the appropriate fraction of the time interval, read across the two pages and interpolate the times of second and third contacts, the duration (D), and the width of path. Make a note of the angles P and V for each contact, and also the altitude (a) and azimuth (A) of the Sun at maximum eclipse. Turn back to the map. Mark the points on the central line corresponding to second and third contact times to estimate the breadth of the projected shadow. On the line previously drawn across the path, measure the length (a) from the center of the path to the edge. In the same fashion measure the length (b) from the center of the path to the selected location. Next compute the approximate duration (T) for the selected location by $T = D\sqrt{1 - (b/a)^2}$. Then the time of second contact is approximately $t_0 - T/2$, third contact $t_0 + T/2$.

POSITION ANGLES. The appropriate profile for this eclipse is reproduced from *Circular No. 141*. For locations in the path of totality, the predicted times and position angles of contacts are based on the Moon's mean limb (the dashed circle). Correction for limb irregularities is discussed later. In working with this construction, remember that position angles are given for the solar disk, which is observable, but corrections are based on features on the lunar disk, shown in the diagram. The two nearly coincide between second and third contacts, so it is adequate to plot angles pertaining to the Sun on the lunar diagram. However, this is not the case for first and fourth contacts. You may find it convenient to use a transparent overlay with a circle of radius three inches.

For each second or third contact to be sketched, take from the tables the time of contact (t_c), the angles P and V , and the altitude (a) and azimuth (A) of the Sun at maximum eclipse, as described above. Convert the time of contact to hours and decimals. Compute the angle C from the following equation, in which all numerical quantities are degrees:

$$C = 355.92 + 0.26t_c - 0.425 \sin(90 - a) \sin(P - V).$$

On the diagram, N marks lunar north. Using the four direction tick marks, find the center of the circle. Draw a line from the center through N . Next measure the angle C westward (clockwise) from N . Mark the point on the mean limb and draw a line from the center through it. This points to the Earth's north celestial pole. From this line, measure back the angle P eastward (counterclockwise) to find the point of contact on the mean limb. Draw a line from the center out through that point. Finally, from that line, measure through the angle V westward (clockwise). Draw a line from the center through this point. This line points to the observer's zenith. Now you can visualize events as follows: Face in the direction of the Sun's azimuth (A), measured in degrees positively from the north point of the horizon around clockwise to the east, hold the diagram up at arm's length at the altitude (a) of the Sun at maximum eclipse, and turn it so that the line pointing to the zenith points straight up. The line to the north point of the disk will point to celestial north for the observing site, and the point of contact at the limb will be at its correct apparent orientation.

To get position angles for locations not listed in the tables, follow the directions above and plot the points of second and third contacts for the interpolated location on the center line. Draw a line connecting the two contacts on the mean limb. It should pass through the center of the disk. Next, draw or construct a perpendicular diameter, which runs approximately north/south. Taking (b/a) from the calculation of duration, measure off $(b/a) \times \text{radius}$ from the center of the circle along the north/south diameter in the same direction as the observing site. Mark the point on the diameter, and draw or construct a perpendicular line parallel to the one through the central line contact points. This new line will intersect the mean limb at approximately the points of contact. The eastern point is for second contact, the western is for third contact. This construction is not as accurate as a full calculation, but adequate for field estimates.

LIMB CORRECTIONS. The use of the diagrams to correct predicted contact times for the rough limb of the Moon is discussed in that section.

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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ACKNOWLEDGEMENTS. Marie Lukac prepared the overall line map and the detailed maps of the path over land. The latter is presented on portions of Operational Navigation Charts (ONC) M-10, M-11, M-12, M-13, N-11, N-12, N-14, N-15, P-16, scale 1:1,000,000, Lambert Conformal Conic Projection. These maps are a product of Defense Mapping Agency Aerospace Center. The map portions in this *Circular* are reduced to 60% of original size, enlarging the scale from 15.78 mi/inch to 26.3 mi/in.

The Limb Profile chart is from *U. S. Naval Observatory Circular No. 141*, "Lunar Limb Profiles for Solar Eclipses," by Julena S. Duncombe, March 16, 1973.

The polynomial representation of the Besselian Elements was contributed by Dr. Leroy Doggett, Nautical Almanac Office.

The climatological data was prepared by a meteorologist, Jay Anderson, of Winnipeg, Manitoba. The complete article was published in the June 1981 Newsletter of the *Bulletin of the Royal Astronomical Society of Canada*. With the permission of the author, a major portion is reprinted here, with a few additional comments about the eastern end of the path.

The Limb Profile Correction chart was conceived, developed, and presented by Mr. David Herald, of Canberra, A.C.T., Australia. It is an ingenious and invaluable tool for all observers, and we are grateful for his efforts and generosity.

OBSERVATIONS. Precise observations of the second and third contact times, at any part of the path, but especially the northern and southern limits, are needed and requested. Since precise coordinates of the observer must be determined, reports of such timings should include location information such as nearest settlement, roads to the site, distance to nearby buildings and the nearest road intersection, distance from the center of the road, etc. The method of timing should also be described. Please send reports to

Nautical Almanac Office
U. S. Naval Observatory
Washington, D. C. 20390, U. S.

FURTHER INFORMATION. Inquiries concerning special calculation of local circumstances and extensions or modifications of data in this publication should be directed to the Nautical Almanac Office.

Indonesia has created a National Committee on the eclipse, chaired by

Prof. Dr. Didin Sastrapradja
Deputy Chmn., Indonesian Council for Sciences
Teuku Cik Ditiro 43
Jakarta, Java, Indonesia.

The I.A.U. National Coordinator is

Dr. Bambang Hidayat
Bosscha Observatory
Lembang, Java, Indonesia

The U. S. National Coordinator is

Dr. Morris Aizenman
National Science Foundation
1800 G St. N.W.
Washington, D. C. 20550, U.S.

These people are all designated to assist scientific investigators and will not usurp the functions of travel agents.

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

ELEMENTS OF THE ECLIPSE

U.T. of geocentric conjunction in right ascension, June 11^d 04^h 33^m 24.480^s
 Julian Day No. 2445496.6898666720

	h	m	s		s
Right Ascension of Sun	5	15	13.498	Hourly motion	10.362
Ascension of Moon	5	15	13.498	Hourly motion	155.664
Δ T			+53.61		
	°	'	"		' "
Declination of Sun	+23	02	33.04	Hourly motion	+ 0 11.08
Declination of Moon	+23	32	29.69	Hourly motion	+ 6 08.25
Equatorial hor. par. of Sun			8.66	True semidiameter of Sun	15 45.1
Equatorial hor. par. of Moon		59	57.52	True semidiameter of Moon	16 20.2

CIRCUMSTANCES OF THE ECLIPSE

	U. T.			Longitude		Latitude	
	d	h	m	°	'	°	'
Eclipse begins	June 11	02	09.5	- 69	43.4	- 26	31.8
Central eclipse begins	11	03	11.3	- 60	10.4	- 36	13.1
Central eclipse at local apparent noon	11	04	33.4	-111	30.0	- 7	10.3
Central eclipse ends	11	06	14.1	-168	20.1	- 18	05.0
Eclipse ends	11	07	15.8	-157	26.3	- 8	05.5

BESSELIAN ELEMENTS, POLYNOMIAL FORM

The equations below represent a simple least-squares polynomial fit to the tabular Besselian Elements. Do not use T outside the given range, and do not omit any terms in the series.

Let T be the Universal Time in hours, such that $2.167 \leq T \leq 7.250$, i.e., $2^h 10^m - 7^h 15^m$

$$\begin{aligned}
 x &= -2.55440031 + 0.56001311 T + 0.00016229 T^2 - 0.00000885 T^3, & \text{Error } < 1 \times 10^{-6} \\
 y &= -0.95938691 + 0.10079365 T - 0.00010854 T^2 - 0.00000170 T^3, & \text{Error } < 1 \times 10^{-6} \\
 \sin d &= +0.39122382 + 0.00004640 T, & \text{Error } < 1 \times 10^{-6} \\
 \cos d &= +0.92029566 - 0.00001978 T, & \text{Error } < 1 \times 10^{-6} \\
 \mu &= 180.15142698 + 14.99936377 T - 0.00000011 T^2, & \text{Error } < 1 \times 10^{-5} \\
 \text{Radius Penumbra} &= +0.53664553 + 0.00002232 T - 0.00001226 T^2, & \text{Error } < 1 \times 10^{-6} \\
 \text{Radius Umbra} &= -0.00965151 + 0.00002172 T - 0.00001209 T^2, & \text{Error } < 1 \times 10^{-6}
 \end{aligned}$$

BESSELIAN ELEMENTS

U.T. h m	Intersection of Axis of Shadow with Fundamental Plane		Direction of Axis of Shadow			Radius of Shadow on Fundamental Plane	
	x	y	sin d	cos d	μ °	Penumbra	Umbra
2 10	-1.340367	-0.741528	+0.391324	0.920253	212.65005	0.536636	-0.009661
20	1.246932	0.724814	.391332	.920250	215.14994	.536631	.009667
30	1.153492	0.708108	.391339	.920246	217.64984	.536625	.009673
40	1.060046	0.691408	.391347	.920243	220.14973	.536618	.009680
50	0.966595	0.674715	.391355	.920240	222.64962	.536610	.009687
3 00	-0.873139	-0.658029	+0.391362	0.920237	225.14952	0.536602	-0.009695
10	0.779679	0.641350	.391370	.920233	227.64941	.536593	.009704
20	0.686214	0.624677	.391378	.920230	230.14930	.536584	.009714
30	0.592746	0.608012	.391385	.920227	232.64920	.536574	.009724
40	0.499273	0.591353	.391393	.920224	235.14909	.536563	.009735
50	0.405797	0.574702	.391400	.920220	237.64898	.536551	.009746
4 00	-0.312318	-0.558058	+0.391408	0.920217	240.14888	0.536539	-0.009758
10	0.218835	0.541421	.391416	.920214	242.64877	.536526	.009771
20	0.125350	0.524791	.391423	.920211	245.14866	.536512	.009785
30	-0.031861	0.508169	.391431	.920208	247.64856	.536498	.009799
40	+0.061629	0.491553	.391438	.920204	250.14845	.536483	.009814
50	0.155122	0.474946	.391446	.920201	252.64834	.536468	.009829
5 00	+0.248616	-0.458345	+0.391454	0.920198	255.14824	0.536451	-0.009846
10	0.342112	0.441752	.391461	.920195	257.64813	.536434	.009862
20	0.435610	0.425167	.391469	.920191	260.14802	.536417	.009880
30	0.529109	0.408589	.391476	.920188	262.64792	.536398	.009898
40	0.622608	0.392018	.391484	.920185	265.14781	.536379	.009917
50	0.716109	0.375456	.391491	.920182	267.64770	.536360	.009937
6 00	+0.809609	-0.358901	+0.391499	0.920179	270.14760	0.536339	-0.009957
10	0.903110	0.342353	.391507	.920175	272.64749	.536318	.009978
20	0.996611	0.325814	.391514	.920172	275.14738	.536296	.010000
30	1.090111	0.309282	.391522	.920169	277.64728	.536274	.010022
40	1.183611	0.292758	.391529	.920166	280.14717	.536251	.010045
50	1.277110	0.276242	.391537	.920162	282.64706	.536227	.010069
7 00	+1.370608	-0.259734	+0.391544	0.920159	285.14695	0.536203	-0.010093
10	+1.464105	-0.243235	+0.391552	0.920156	287.64685	0.536177	-0.010118

TAN F1 0.004606
 TAN F2 0.004582
 MU° 0.261788 RADIANS/HR
 D° +0.000050 RADIANS/HR

LIMB CORRECTIONS

For locations in the path of totality, the predicted times and position angles of contacts are based on the Moon's mean limb, assumed to be a circle. There is a further correction for irregularities of the limb which has not been applied to the predictions printed in this publication.

Actual contact occurs not at the mean lunar limb, but at the lowest point of any feature along the limb near the predicted contact point. Inspection of the profile will reveal these features. The Moon is gaining on the Sun at approximately 0.6 seconds of arc per second of time (see Elements of the Eclipse). Measuring the difference radially between the mean and true limbs at the contact point and comparing it to the scale segment will give an estimate of the time correction to be applied to the contacts. In general, second contact will be late and third contact early.

Mr. David Herald, of Canberra, A.C.T., Australia, has developed a graphical method for obtaining these corrections very quickly and easily. First, using the Elements of the Eclipse and the appropriate limb chart, a curve of the displacement of the true limb from the mean circular limb at contact is generated. Second, a curve of the displacement of the solar limb from the mean lunar limb for a specified time interval is constructed. The first curve is slightly time-dependent, but one generated for the middle region of the path will suffice for the entire eclipse. The second curve is highly site-dependent. Included on the facing page is the diagram for Java. Similar diagrams for Sulawesi and Papua New Guinea are available elsewhere.

To use the curve, first determine the contact points as described under Local Circumstances. The limb correction diagram facing approximately overlays the limb profile diagram. The heavy irregular curve is the displacement curve which represents the true contact limb of the Moon. The inner smooth curves represent the solar limb at 10 seconds from the contacts. At a given angle, the fraction of the 10 second interval from the mean limb to the contact limb should be applied to the predicted contact time as indicated. For example, at 100 degrees, second contact should occur 9 seconds later than predicted. At 280 degrees, third contact should be 4 seconds early, while at 302 degrees it should be on time.

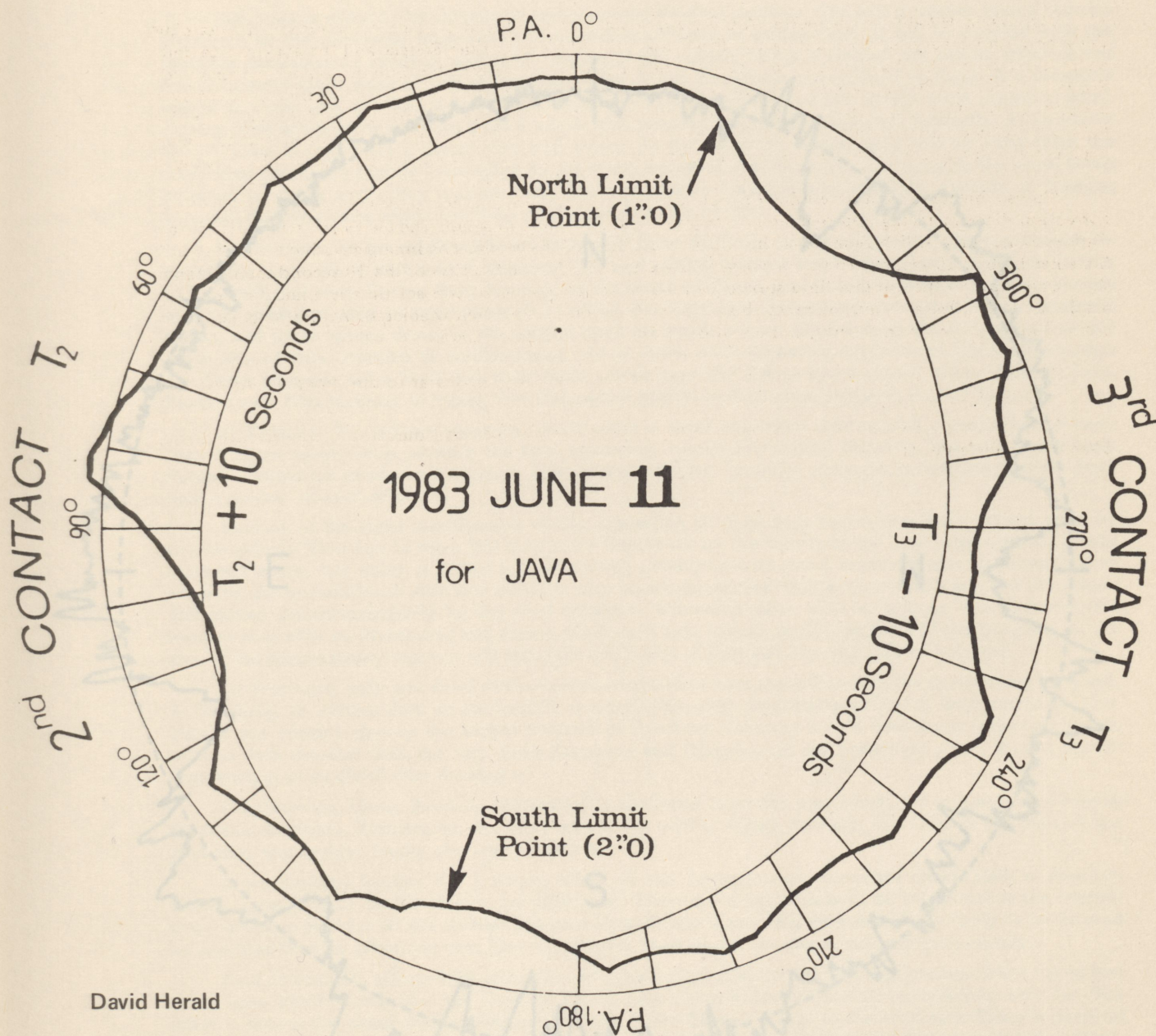
The north and south limit points mark the lunar diameter perpendicular to the apparent direction of motion of the Moon.

The above process may also be used to estimate the occurrence and duration of the diamond ring effect and Bailey's Beads.

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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LIMB CORRECTION CHART



LIMB CORRECTION CHART

For locations in the path of totality, the predicted times of contact are based on the Moon's mean limb, assumed to be a circle. There is a further correction for irregularities of the limb which has not been applied to the data in this publication.

Actual contact times may differ from the predicted times at the points of contact. The Moon is gaining on the Sun at approximately 0.8 seconds per second of time. The elements of the eclipse, measured from the beginning of the eclipse, are given in the table. The difference between the predicted and actual times of contact is given in the table. The difference between the predicted and actual times of contact is given in the table.

Mr. David Herald, of Canberra, A.C.T., Australia, has devised a method for obtaining the predicted times of contact. The method is based on the assumption that the Moon's limb is a circle. The method is based on the assumption that the Moon's limb is a circle. The method is based on the assumption that the Moon's limb is a circle.

The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact.

The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact. The chart is a circular diagram showing the predicted times of contact.



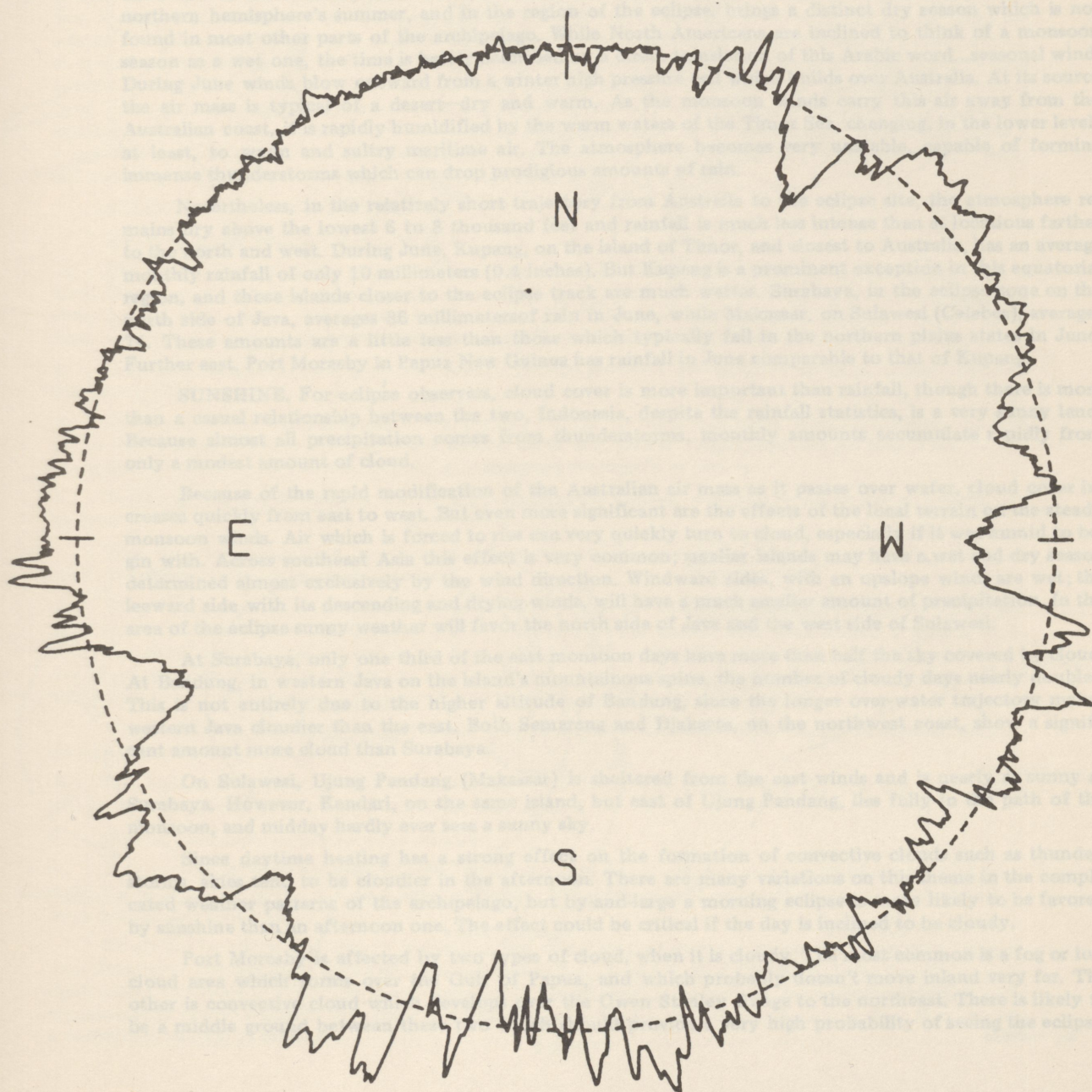
David Herald

LUNAR LIMB PROFILE

13

L=-4°00 B=0°00

RADIAL SCALE: 1 SECOND OF ARC = ———
 DOTTED LINE = MEAN LIMB SOLID LINE = TRUE LIMB



THE HISTORY OF THE

UNITED STATES OF AMERICA

The history of the United States of America is a story of growth and change. It begins with the first settlers, who came to the continent in search of a new life. They found a land of opportunity, but also of hardship. The early years were marked by struggle and sacrifice, as the settlers fought to establish a new society. Over time, the United States grew from a small colony into a great nation. It became a land of freedom and opportunity, where people from all over the world came to seek their fortune. The United States has a rich and diverse history, and it is a country that has made many contributions to the world. It is a country that has stood for freedom and justice, and it is a country that has inspired people all over the world. The history of the United States is a story of hope and dreams, and it is a story that continues to inspire us today.

Normally only a few weather statistics are available for use in these *Circulars*. As a refreshing change, Mr. Jay Anderson, of Weather Canada in Winnipeg, has written an extremely readable and complete report on the climate of and outlook for the eclipse region, incorporating statistics and satellite studies. The complete report was published elsewhere. With the kind permission of Mr. Anderson, we present an abridged version with a few additional remarks about Papua New Guinea.

WEATHER PROSPECTS FOR THE 1983 INDONESIAN ECLIPSE

This part of the world has a climatology typical of the inner tropics, substantially modified by a number of unique local features. Temperatures are high, but not excessive, with an annual range so small that it does not distinguish the seasons. The region is the largest area of the globe with an annual rainfall of 2500 millimeters (100 inches) or more. The air is humid year round, yet, strangely, sunshine is abundant.

Indonesia is affected by three large scale seasonal weather patterns. The east monsoon season (known elsewhere as the southwest monsoon) will be well-established at eclipse time. It can be equated with the northern hemisphere's summer, and in the region of the eclipse, brings a distinct dry season which is not found in most other parts of the archipelago. While North Americans are inclined to think of a monsoon season as a wet one, the time is better described by a direct translation of this Arabic word...seasonal wind. During June winds blow outward from a winter high pressure cell which builds over Australia. At its source the air mass is typical of a desert—dry and warm. As the monsoon winds carry this air away from the Australian coast, it is rapidly humidified by the warm waters of the Timor Sea, changing, in the lower levels at least, to warm and sultry maritime air. The atmosphere becomes very unstable, capable of forming immense thunderstorms which can drop prodigious amounts of rain.

Nevertheless, in the relatively short trajectory from Australia to the eclipse site, the atmosphere remains dry above the lowest 6 to 8 thousand feet and rainfall is much less intense than at locations farther to the north and west. During June, Kupang, on the island of Timor, and closest to Australia, has an average monthly rainfall of only 10 millimeters (0.4 inches). But Kupang is a prominent exception in this equatorial region, and those islands closer to the eclipse track are much wetter. Surabaya, in the eclipse zone on the north side of Java, averages 86 millimeters of rain in June, while Makassar, on Sulawesi (Celebes), averages 74. These amounts are a little less than those which typically fall in the northern plains states in June. Further east, Port Moresby in Papua New Guinea has rainfall in June comparable to that of Kupang.

SUNSHINE. For eclipse observers, cloud cover is more important than rainfall, though there is more than a casual relationship between the two. Indonesia, despite the rainfall statistics, is a very sunny land. Because almost all precipitation comes from thunderstorms, monthly amounts accumulate rapidly from only a modest amount of cloud.

Because of the rapid modification of the Australian air mass as it passes over water, cloud cover increases quickly from east to west. But even more significant are the effects of the local terrain on the steady monsoon winds. Air which is forced to rise can very quickly turn to cloud, especially if it was humid to begin with. Across southeast Asia this effect is very common; smaller islands may have a wet and dry season determined almost exclusively by the wind direction. Windward sides, with an upslope wind, are wet; the leeward side with its descending and drying winds, will have a much smaller amount of precipitation. In the area of the eclipse sunny weather will favor the north side of Java and the west side of Sulawesi.

At Surabaya, only one third of the east monsoon days have more than half the sky covered by cloud. At Bandung, in western Java on the island's mountainous spine, the number of cloudy days nearly doubles. This is not entirely due to the higher altitude of Bandung, since the longer over-water trajectory makes western Java cloudier than the east. Both Semarang and Djakarta, on the northwest coast, show a significant amount more cloud than Surabaya.

On Sulawesi, Ujung Pandang (Makassar) is sheltered from the east winds and is nearly as sunny as Surabaya. However, Kendari, on the same island, but east of Ujung Pandang, lies fully in the path of the monsoon, and midday hardly ever sees a sunny sky.

Since daytime heating has a strong effect on the formation of convective clouds such as thunderstorms, skies tend to be cloudier in the afternoon. There are many variations on this theme in the complicated weather patterns of the archipelago, but by-and-large a morning eclipse is more likely to be favored by sunshine than an afternoon one. The effect could be critical if the day is inclined to be cloudy.

Port Moresby is affected by two types of cloud, when it is cloudy. The most common is a fog or low cloud area which forms over the Gulf of Papua, and which probably doesn't move inland very far. The other is convective cloud which develops over the Owen Stanley Range to the northeast. There is likely to be a middle ground between these two which should provide a very high probability of seeing the eclipse.

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

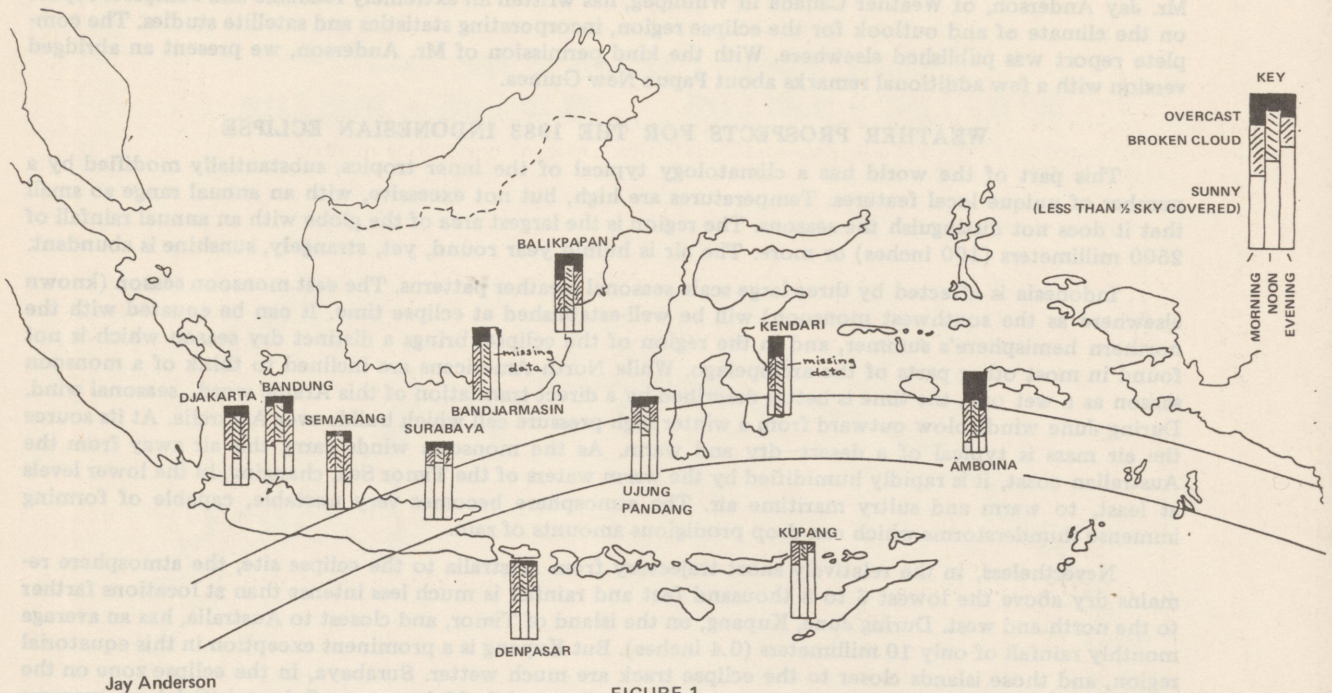


FIGURE 1

Relative Cloudiness Along the Eclipse Track During the East Monsoon

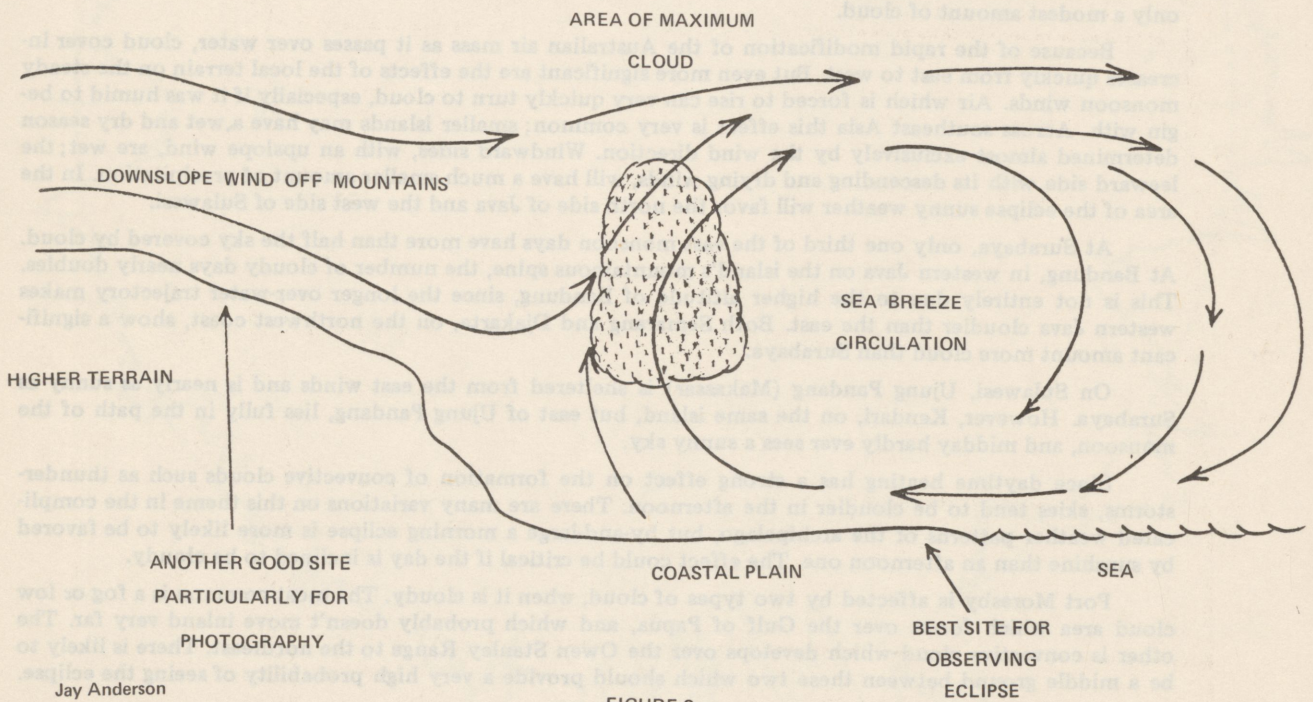


FIGURE 2

Satellite photographs taken in June of 1977 and 1979 offer considerable encouragement, reflecting the promising statistics of Figure 1. The photos confirm that cloud is less likely in the morning than in the afternoon and evening. However considerable cloud can be found overnight as well, some because of coastal fog, some because thunderstorms formed when cooling air flowing off the land triggered the instability.

VISIBILITY. The onset of the east monsoon is marked by a decrease in visibility as a dry haze changes the sky to a blue-grey color. The haze is composed of salt particles evaporated from the sea surface, with additional material added from grass and forest fires. Drought conditions in Australia aggravate the problem, and it tends to worsen as the east monsoon progresses. The lack of extensive cleansing rainfalls is a contributing factor. The haze is confined to the lower atmosphere, along with most of the humidity. At altitudes above the haze layer, between 6 and 10 thousand feet above sea level, the air is dryer and the sky returns to its familiar blue tint.

WINDS. On the average, the east monsoon becomes established in May and blows for several months. The mountainous islands and sea channels have a strong directive influence, turning the winds to blow parallel to the coasts. Land and sea breezes alternate during the night and day as the warming effect of the sun sets up the characteristic off- and on-shore winds. Sea breezes, which bring onshore winds, are very efficient at preventing the formation of convective cloud for several miles inland from the coast. This breeze begins toward mid-morning along the coast and gradually presses inland. The cloud edge, if there is one, retreats from the coast, provided the interior terrain is relatively flat and close to sea level. Bays are particularly suitable locations to benefit from this effect, while peninsulas offer the poorest prospects. The sea breeze is a low level circulation, so that eclipse sites may take advantage of the protection of higher terrain, while still enjoying a wind which blows off the sea at the surface (Figure 2).

SELECTING THE ECLIPSE SITE

The most likely weather pattern is this:

1. The probability of sunny weather is high (approximately 65%), especially on the northeast coast of Java. Clouds may be building for the afternoon. Higher elevations will have the greatest tendency to cloud over, though this is not a pronounced factor in east Java. Locations in the lee of higher ground (northeast Java, southwest Sulawesi) are best. Coastal sites with an onshore sea breeze give additional assurances.
2. Haze will bring some reduction to visibility, though probably not less than 10 miles. Higher locations will have a bluer sky.
3. Moderate east to east-southeast winds are most likely on the south coast. Winds will follow the terrain in inland areas. By late morning north coastal areas will have the beginnings of a sea breeze which may strengthen or weaken the monsoon winds, depending on the coast's exposure.
4. Temperatures and humidities will be high, close to 30 Celsius. High mountain passes or saddles will be drier.

With these characteristics in mind, an eclipse site can be selected to maximize the probability of a good view. Some techniques which may help:

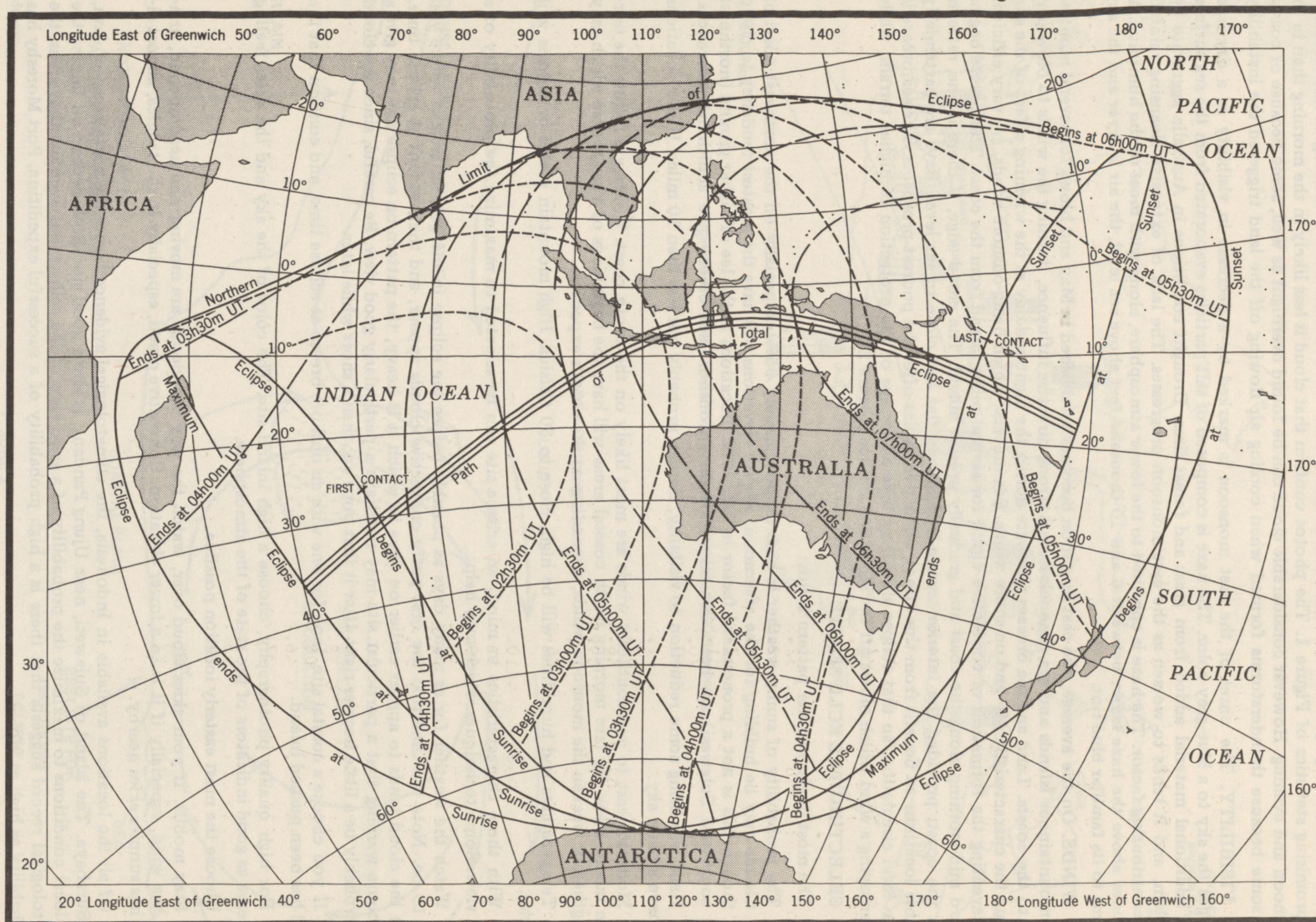
1. Watch the weather for as many days as possible before the eclipse in the general area of where you wish to be. Note the time that the first puffy convective clouds appear, and their extent at eclipse time. Since the cloud tends to appear earlier on days in which it is heavy, the pattern on eclipse day may give a few hours warning that a particular site may not have a particularly good view. Be careful, since the cloud will probably be a little heavier right after it first pops up, than a short while later.

If you choose a coastal site, look for one with an onshore breeze at eclipse time, and confirm that the cloud has been pushed inland.

2. For high quality photography, choose a high inland site. The color of the sky and the drier feeling will serve as good indicators of the state of the atmosphere.
3. Choose the most easterly location possible.
4. Stay mobile. If your skies cloud over, watch the way the clouds are moving, and head upwind, or across the wind, especially if it is to a lower elevation. Convective cloud, especially in the tropics, almost always has sunnier skies nearby.

Of all the locations available in Indonesia, the climatological evidence favors the north coast of Java, near Surabaya. The island of Sulawesi, near Ujung Pandang, is also a good site. Both depend on finding the right local conditions to maximize the probability of a good view of the eclipse, but even in other areas, the climatological record suggests that there is a high probability of a successful expedition. Port Moresby has a probability as high as 90%.

TOTAL SOLAR ECLIPSE OF 1983 JUNE 11



TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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PATH OF THE TOTAL PHASE

Universal Time h m	Northern Limit		Central Line		Southern Limit	
	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude
LIMIT	- 59 53.8	-35 39.9	- 60 10.4	-36 13.1	- 60 27.3	-36 46.4
3 12	- 67 44.1	-31 52.6	- 66 32.3	-33 12.4	- 64 35.5	-34 52.2
3 14	72 35.5	29 17.3	72 09.0	30 17.7	71 35.0	31 21.6
3 16	75 47.1	27 29.2	75 33.8	28 24.3	75 16.3	29 21.5
3 18	78 16.9	26 01.4	78 10.6	26 53.9	78 01.2	27 48.0
3 20	- 80 22.4	-24 45.7	- 80 20.5	-25 36.7	- 80 16.3	-26 29.0
3 25	84 33.6	22 08.8	84 38.4	22 57.9	84 41.5	23 48.0
3 30	- 87 52.5	-20 00.5	- 88 00.9	-20 48.8	- 88 08.1	-21 38.0
3 35	90 40.1	18 10.5	90 50.9	18 58.5	91 00.7	19 47.4
3 40	93 06.7	16 33.7	93 19.2	17 21.7	93 30.8	18 10.5
3 45	95 18.5	15 07.1	95 32.2	15 55.3	95 45.0	16 44.2
3 50	97 19.2	13 48.8	97 33.7	14 37.4	97 47.5	15 26.5
3 55	99 11.3	12 37.6	99 26.4	13 26.5	99 40.9	14 15.9
4 00	-100 56.9	-11 32.5	-101 12.4	-12 21.8	-101 27.4	-13 11.5
4 05	102 37.4	10 32.9	102 53.1	11 22.5	103 08.4	12 12.7
4 10	104 13.8	9 38.1	104 29.7	10 28.2	104 45.1	11 18.8
4 15	105 47.1	8 47.9	106 03.0	9 38.5	106 18.4	10 29.5
4 20	107 18.0	8 01.9	107 33.8	8 53.0	107 49.2	9 44.4
4 25	108 47.2	7 20.0	109 02.8	8 11.5	109 18.1	9 03.3
4 30	-110 15.3	- 6 41.9	-110 30.6	- 7 33.8	-110 45.7	- 8 26.0
4 35	111 42.7	6 07.6	111 57.6	6 59.9	112 12.4	7 52.5
4 40	113 09.9	5 36.9	113 24.5	6 29.5	113 38.9	7 22.5
4 45	114 37.3	5 09.8	114 51.5	6 02.8	115 05.6	6 56.1
4 50	116 05.5	4 46.3	116 19.2	5 39.6	116 32.8	6 33.1
4 55	117 34.8	4 26.5	117 47.9	5 20.0	118 01.1	6 13.8
5 00	-119 05.7	- 4 10.4	-119 18.3	- 5 04.1	-119 31.0	- 5 58.0
5 05	120 38.6	3 58.1	120 50.7	4 51.9	121 03.0	5 45.9
5 10	122 14.2	3 49.7	122 25.7	4 43.6	122 37.5	5 37.7
5 15	123 52.9	3 45.4	124 03.9	4 39.4	124 15.3	5 33.5
5 20	125 35.5	3 45.6	125 46.0	4 39.4	125 57.0	5 33.5
5 25	127 22.9	3 50.4	127 32.9	4 44.2	127 43.5	5 38.2
5 30	-129 15.9	- 4 00.4	-129 25.7	- 4 54.0	-129 36.0	- 5 47.8
5 35	131 16.0	4 16.1	131 25.5	5 09.5	131 35.7	6 03.1
5 40	133 24.8	4 38.2	133 34.2	5 31.4	133 44.5	6 24.8
5 45	135 44.7	5 08.0	135 54.3	6 00.9	136 04.8	6 54.1
5 50	138 18.9	5 46.8	138 29.1	6 39.4	138 40.3	7 32.5
5 55	141 12.8	6 37.2	141 24.1	7 29.7	141 36.6	8 22.6
6 00	-144 35.3	- 7 43.2	-144 48.7	- 8 35.8	-145 03.8	- 9 28.9
6 05	148 44.2	9 13.0	149 02.1	10 06.4	149 22.2	11 00.6
6 10	-154 27.9	-11 28.6	-154 57.9	-12 25.6	-155 32.5	-13 24.2
6 12	157 49.0	12 52.2	158 33.6	13 54.5	-159 27.5	-15 00.4
6 14	-163 25.9	-15 16.4	-165 51.8	-17 01.0		

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

PATH OF THE TOTAL PHASE

Northern Limit			Central Line			Southern Limit			Maximum Duration m s	Path Width km	Sun's	
Longitude ° '	U.T. h m	Latitude ° '	U.T. h m	Latitude ° '	U.T. h m	Latitude ° '	U.T. h m	Latitude ° '			Alt. °	Az. °
-105 00	4 12.46	- 9 12.9	4 11.61	-10 11.8	4 10.79	-11 10.7	4 49.0	119	55	19		
105 30	4 14.07	8 56.9	4 13.22	9 55.7	4 12.39	10 54.7	4 50.9	119	55	18		
106 00	4 15.70	8 41.2	4 14.84	9 40.0	4 14.00	10 39.0	4 52.8	119	56	17		
106 30	4 17.35	8 25.8	4 16.48	9 24.6	4 15.63	10 23.6	4 54.6	120	56	15		
107 00	4 19.00	8 10.8	4 18.13	9 09.6	4 17.27	10 08.4	4 56.2	120	57	14		
107 30	4 20.67	7 56.1	4 19.79	8 54.8	4 18.93	9 53.7	4 57.9	121	57	13		
108 00	4 22.34	7 41.8	4 21.46	8 40.4	4 20.60	9 39.2	4 59.4	121	58	11		
108 30	4 24.03	7 27.8	4 23.15	8 26.4	4 22.28	9 25.1	5 00.9	122	58	10		
109 00	4 25.72	7 14.3	4 24.84	8 12.7	4 23.98	9 11.4	5 02.2	122	58	8		
109 30	4 27.42	7 01.1	4 26.54	7 59.5	4 25.68	8 58.0	5 03.5	123	59	7		
-110 00	4 29.13	- 6 48.3	4 28.25	- 7 46.6	4 27.39	- 8 45.1	5 04.7	123	59	5		
110 30	4 30.84	6 35.9	4 29.97	7 34.1	4 29.10	8 32.5	5 05.8	123	59	3		
111 00	4 32.56	6 23.9	4 31.69	7 22.0	4 30.82	8 20.3	5 06.8	124	60	2		
111 30	4 34.27	6 12.3	4 33.41	7 10.3	4 32.55	8 08.5	5 07.7	124	60	0		
112 00	4 35.99	6 01.2	4 35.14	6 59.0	4 34.28	7 57.1	5 08.5	124	60	358		
112 30	4 37.71	5 50.5	4 36.86	6 48.1	4 36.02	7 46.1	5 09.1	125	60	357		
113 00	4 39.43	5 40.2	4 38.59	6 37.7	4 37.75	7 35.5	5 09.7	125	60	355		
113 30	4 41.15	5 30.3	4 40.32	6 27.7	4 39.48	7 25.4	5 10.2	125	60	353		
114 00	4 42.87	5 20.9	4 42.05	6 18.2	4 41.22	7 15.7	5 10.5	126	60	351		
114 30	4 44.58	5 11.9	4 43.77	6 09.1	4 42.95	7 06.5	5 10.7	126	60	350		
-115 00	4 46.29	- 5 03.4	4 45.49	- 6 00.4	4 44.68	- 6 57.6	5 10.9	126	60	348		
115 30	4 47.99	4 55.3	4 47.20	5 52.2	4 46.41	6 49.3	5 10.9	126	60	346		
116 00	4 49.69	4 47.7	4 48.91	5 44.4	4 48.13	6 41.3	5 10.8	126	60	344		
116 30	4 51.38	4 40.5	4 50.61	5 37.0	4 49.84	6 33.8	5 10.6	126	60	343		
117 00	4 53.06	4 33.8	4 52.31	5 30.1	4 51.55	6 26.8	5 10.3	126	60	341		
117 30	4 54.73	4 27.5	4 54.00	5 23.7	4 53.25	6 20.2	5 09.9	126	60	339		
118 00	4 56.40	4 21.6	4 55.67	5 17.7	4 54.94	6 14.0	5 09.3	126	59	338		
118 30	4 58.05	4 16.2	4 57.34	5 12.1	4 56.62	6 08.3	5 08.7	126	59	336		
119 00	4 59.69	4 11.3	4 59.00	5 07.0	4 58.29	6 03.0	5 08.0	126	59	335		
119 30	5 01.32	4 06.8	5 00.64	5 02.3	4 59.94	5 58.2	5 07.1	126	58	333		
-120 00	5 02.94	- 4 02.7	5 02.27	- 4 58.1	5 01.59	- 5 53.8	5 06.2	126	58	332		
120 30	5 04.54	3 59.0	5 03.89	4 54.3	5 03.22	5 49.8	5 05.2	126	58	331		
121 00	5 06.13	3 55.8	5 05.50	4 50.9	5 04.84	5 46.3	5 04.1	126	57	329		
121 30	5 07.71	3 53.0	5 07.09	4 48.0	5 06.45	5 43.2	5 02.9	126	57	328		
122 00	5 09.27	3 50.7	5 08.66	4 45.4	5 08.04	5 40.5	5 01.6	125	56	327		
122 30	5 10.81	3 48.7	5 10.22	4 43.3	5 09.61	5 38.2	5 00.2	125	56	325		
123 00	5 12.34	3 47.2	5 11.77	4 41.6	5 11.17	5 36.4	4 58.8	125	55	324		
123 30	5 13.86	3 46.0	5 13.29	4 40.3	5 12.71	5 34.9	4 57.3	125	55	323		
124 00	5 15.35	3 45.3	5 14.80	4 39.4	5 14.23	5 33.9	4 55.7	124	54	322		
124 30	5 16.83	3 45.0	5 16.30	4 39.0	5 15.74	5 33.2	4 54.0	124	54	321		
-125 00	5 18.29	- 3 45.0	5 17.77	- 4 38.9	5 17.23	- 5 33.0	4 52.3	124	53	320		
125 30	5 19.74	3 45.4	5 19.23	4 39.1	5 18.70	5 33.1	4 50.5	123	53	319		
126 00	5 21.16	3 46.3	5 20.67	4 39.8	5 20.15	5 33.6	4 48.7	123	52	318		
126 30	5 22.57	3 47.4	5 22.09	4 40.8	5 21.58	5 34.5	4 46.8	122	52	317		
127 00	5 23.95	3 49.0	5 23.49	4 42.2	5 22.99	5 35.7	4 44.9	122	51	317		
127 30	5 25.32	3 50.9	5 24.87	4 44.0	5 24.38	5 37.3	4 42.9	122	50	316		
128 00	5 26.67	3 53.2	5 26.23	4 46.1	5 25.75	5 39.3	4 40.9	121	50	315		
128 30	5 28.00	3 55.8	5 27.57	4 48.6	5 27.10	5 41.6	4 38.9	121	49	314		
129 00	5 29.31	3 58.7	5 28.89	4 51.3	5 28.43	5 44.2	4 36.8	120	49	314		
129 30	5 30.60	4 02.0	5 30.19	4 54.5	5 29.74	5 47.2	4 34.7	120	48	313		

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

21

PATH OF THE TOTAL PHASE

Longitude ° ' "	Northern Limit		Central Line		Southern Limit		Maximum Duration m s	Path Width km	Sun's	
	U.T. h m	Latitude ° ' "	U.T. h m	Latitude ° ' "	U.T. h m	Latitude ° ' "			Alt. °	Az. °
-130 00	5 31.87	- 4 05.6	5 31.47	- 4 57.9	5 31.03	- 5 50.5	4 32.5	119	47	312
130 30	5 33.12	4 09.5	5 32.73	5 01.7	5 32.30	5 54.1	4 30.3	119	47	312
131 00	5 34.35	4 13.7	5 33.96	5 05.8	5 33.54	5 58.1	4 28.2	118	46	311
131 30	5 35.56	4 18.2	5 35.18	5 10.2	5 34.77	6 02.3	4 25.9	118	45	311
132 00	5 36.75	4 23.1	5 36.38	5 14.8	5 35.97	6 06.8	4 23.7	117	45	310
132 30	5 37.92	4 28.2	5 37.55	5 19.8	5 37.16	6 11.6	4 21.5	117	44	310
133 00	5 39.07	4 33.6	5 38.71	5 25.1	5 38.32	6 16.8	4 19.2	116	43	309
133 30	5 40.19	4 39.2	5 39.84	5 30.6	5 39.46	6 22.1	4 17.0	116	43	309
134 00	5 41.30	4 45.2	5 40.95	5 36.4	5 40.58	6 27.8	4 14.7	115	42	308
134 30	5 42.39	4 51.4	5 42.05	5 42.5	5 41.67	6 33.7	4 12.4	115	41	308
-135 00	5 43.45	- 4 57.9	5 43.12	- 5 48.8	5 42.75	- 6 39.9	4 10.2	114	41	307
135 30	5 44.50	5 04.6	5 44.17	5 55.4	5 43.80	6 46.3	4 07.9	114	40	307
136 00	5 45.52	5 11.6	5 45.20	6 02.2	5 44.84	6 53.0	4 05.6	113	39	307
136 30	5 46.53	5 18.8	5 46.20	6 09.2	5 45.85	6 59.9	4 03.3	113	39	306
137 00	5 47.51	5 26.2	5 47.19	6 16.5	5 46.84	7 07.0	4 01.1	112	38	306
137 30	5 48.47	5 33.8	5 48.16	6 24.0	5 47.81	7 14.4	3 58.8	112	37	306
138 00	5 49.42	5 41.7	5 49.10	6 31.8	5 48.76	7 21.9	3 56.6	111	37	305
138 30	5 50.34	5 49.8	5 50.03	6 39.7	5 49.69	7 29.7	3 54.3	111	36	305
139 00	5 51.24	5 58.1	5 50.93	6 47.8	5 50.59	7 37.7	3 52.1	110	35	305
139 30	5 52.12	6 06.6	5 51.82	6 56.2	5 51.48	7 45.9	3 49.9	109	35	304
-140 00	5 52.99	- 6 15.3	5 52.68	- 7 04.7	5 52.35	- 7 54.3	3 47.7	109	34	304
140 30	5 53.83	6 24.2	5 53.53	7 13.5	5 53.19	8 02.9	3 45.5	108	33	304
141 00	5 54.65	6 33.2	5 54.35	7 22.4	5 54.02	8 11.6	3 43.3	108	33	303
141 30	5 55.46	6 42.5	5 55.16	7 31.5	5 54.82	8 20.6	3 41.1	107	32	303
142 00	5 56.24	6 51.9	5 55.94	7 40.7	5 55.61	8 29.7	3 39.0	107	31	303
142 30	5 57.01	7 01.5	5 56.71	7 50.2	5 56.38	8 39.0	3 36.8	106	31	303
143 00	5 57.75	7 11.2	5 57.45	7 59.7	5 57.12	8 48.4	3 34.7	106	30	303
143 30	5 58.48	7 21.1	5 58.18	8 09.5	5 57.85	8 58.0	3 32.6	105	29	302
144 00	5 59.19	7 31.2	5 58.89	8 19.4	5 58.56	9 07.7	3 30.5	105	29	302
144 30	5 59.88	7 41.4	5 59.58	8 29.4	5 59.25	9 17.6	3 28.5	104	28	302
-145 00	6 00.55	- 7 51.7	6 00.25	- 8 39.6	5 59.92	- 9 27.6	3 26.4	104	27	302
145 30	6 01.20	8 02.2	6 00.90	8 49.9	6 00.57	9 37.8	3 24.4	103	27	301
146 00	6 01.84	8 12.8	6 01.54	9 00.4	6 01.20	9 48.1	3 22.4	103	26	301
146 30	6 02.46	8 23.5	6 02.15	9 11.0	6 01.82	9 58.5	3 20.4	102	25	301
147 00	6 03.06	8 34.4	6 02.75	9 21.7	6 02.41	10 09.1	3 18.5	102	25	301
147 30	6 03.64	8 45.4	6 03.33	9 32.5	6 02.99	10 19.7	3 16.5	101	24	301
148 00	6 04.20	8 56.5	6 03.89	9 43.4	6 03.55	10 30.5	3 14.6	101	24	301
148 30	6 04.75	9 07.7	6 04.44	9 54.5	6 04.10	10 41.4	3 12.7	101	23	300
149 00	6 05.28	9 19.0	6 04.96	10 05.6	6 04.62	10 52.4	3 10.9	100	22	300
149 30	6 05.79	9 30.4	6 05.48	10 16.9	6 05.13	11 03.5	3 09.0	100	22	300
-150 00	6 06.29	- 9 41.9	6 05.97	-10 28.3	6 05.62	-11 14.7	3 07.2	99	21	300
150 30	6 06.76	9 53.6	6 06.45	10 39.7	6 06.10	11 25.9	3 05.4	99	20	300
151 00	6 07.23	10 05.3	6 06.91	10 51.3	6 06.56	11 37.3	3 03.6	98	20	300
151 30	6 07.67	10 17.1	6 07.35	11 02.9	6 07.00	11 48.8	3 01.8	98	19	299
152 00	6 08.11	10 28.9	6 07.78	11 14.6	6 07.43	12 00.3	3 00.1	97	19	299
152 30	6 08.52	10 40.9	6 08.19	11 26.4	6 07.84	12 12.0	2 58.3	97	18	299
153 00	6 08.92	10 52.9	6 08.59	11 38.3	6 08.23	12 23.7	2 56.6	96	17	299
153 30	6 09.30	11 05.0	6 08.97	11 50.2	6 08.61	12 35.4	2 54.9	96	17	299
154 00	6 09.67	11 17.2	6 09.34	12 02.2	6 08.97	12 47.3	2 53.3	96	16	299
-154 30	6 10.02	-11 29.5	6 09.69	-12 14.3	6 09.32	-12 59.2	2 51.6	95	16	298

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

PATH OF THE CENTRAL LINE

Longitude ° ' "	Surface		20,000 Ft.		40,000 Ft.		Maximum Duration m s	Path Width km	Sun's	
	U.T. h m	Latitude ° ' "	U.T. h m	Latitude ° ' "	U.T. h m	Latitude ° ' "			Alt. °	Az. °
-105 00	4 11.61	-10 11.8	4 11.57	-10 10.0	4 11.53	-10 08.2	4 49.0	119	55	19
105 30	4 13.22	9 55.7	4 13.18	9 53.9	4 13.14	9 52.2	4 50.9	119	55	18
106 00	4 14.84	9 40.0	4 14.80	9 38.2	4 14.77	9 36.4	4 52.8	119	56	17
106 30	4 16.48	9 24.6	4 16.44	9 22.8	4 16.41	9 21.0	4 54.6	120	56	15
107 00	4 18.13	9 09.6	4 18.10	9 07.7	4 18.07	9 05.9	4 56.2	120	57	14
107 30	4 19.79	8 54.8	4 19.76	8 53.0	4 19.74	8 51.1	4 57.9	121	57	13
108 00	4 21.46	8 40.4	4 21.44	8 38.6	4 21.42	8 36.7	4 59.4	121	58	11
108 30	4 23.15	8 26.4	4 23.13	8 24.5	4 23.11	8 22.7	5 00.9	122	58	10
109 00	4 24.84	8 12.7	4 24.82	8 10.9	4 24.81	8 09.0	5 02.2	122	58	8
109 30	4 26.54	7 59.5	4 26.53	7 57.6	4 26.52	7 55.7	5 03.5	123	59	7
-110 00	4 28.25	- 7 46.6	4 28.24	- 7 44.7	4 28.23	- 7 42.8	5 04.7	123	59	5
110 30	4 29.97	7 34.1	4 29.96	7 32.2	4 29.95	7 30.3	5 05.8	123	59	3
111 00	4 31.69	7 22.0	4 31.68	7 20.0	4 31.68	7 18.1	5 06.8	124	60	2
111 30	4 33.41	7 10.3	4 33.41	7 08.4	4 33.41	7 06.4	5 07.7	124	60	0
112 00	4 35.14	6 59.0	4 35.14	6 57.1	4 35.14	6 55.1	5 08.5	124	60	358
112 30	4 36.86	6 48.1	4 36.87	6 46.2	4 36.88	6 44.3	5 09.1	125	60	357
113 00	4 38.59	6 37.7	4 38.60	6 35.8	4 38.61	6 33.8	5 09.7	125	60	355
113 30	4 40.32	6 27.7	4 40.33	6 25.8	4 40.35	6 23.8	5 10.2	125	60	353
114 00	4 42.05	6 18.2	4 42.06	6 16.2	4 42.08	6 14.3	5 10.5	126	60	351
114 30	4 43.77	6 09.1	4 43.79	6 07.1	4 43.81	6 05.2	5 10.7	126	60	350
-115 00	4 45.49	- 6 00.4	4 45.51	- 5 58.4	4 45.53	- 5 56.5	5 10.9	126	60	348
115 30	4 47.20	5 52.2	4 47.23	5 50.2	4 47.25	5 48.2	5 10.9	126	60	346
116 00	4 48.91	5 44.4	4 48.94	5 42.4	4 48.97	5 40.5	5 10.8	126	60	344
116 30	4 50.61	5 37.0	4 50.65	5 35.1	4 50.68	5 33.1	5 10.6	126	60	343
117 00	4 52.31	5 30.1	4 52.34	5 28.2	4 52.38	5 26.2	5 10.3	126	60	341
117 30	4 54.00	5 23.7	4 54.03	5 21.7	4 54.07	5 19.8	5 09.9	126	60	339
118 00	4 55.67	5 17.7	4 55.71	5 15.7	4 55.76	5 13.8	5 09.3	126	59	338
118 30	4 57.34	5 12.1	4 57.38	5 10.2	4 57.43	5 08.2	5 08.7	126	59	336
119 00	4 59.00	5 07.0	4 59.04	5 05.1	4 59.09	5 03.1	5 08.0	126	59	335
119 30	5 00.64	5 02.3	5 00.69	5 00.4	5 00.74	4 58.4	5 07.1	126	58	333
-120 00	5 02.27	- 4 58.1	5 02.33	- 4 56.1	5 02.38	- 4 54.2	5 06.2	126	58	332
120 30	5 03.89	4 54.3	5 03.95	4 52.3	5 04.00	4 50.4	5 05.2	126	58	331
121 00	5 05.50	4 50.9	5 05.55	4 49.0	5 05.61	4 47.0	5 04.1	126	57	329
121 30	5 07.09	4 48.0	5 07.15	4 46.0	5 07.21	4 44.1	5 02.9	126	57	328
122 00	5 08.66	4 45.4	5 08.73	4 43.5	5 08.79	4 41.6	5 01.6	125	56	327
122 30	5 10.22	4 43.3	5 10.29	4 41.4	5 10.35	4 39.5	5 00.2	125	56	325
123 00	5 11.77	4 41.6	5 11.83	4 39.7	5 11.90	4 37.8	4 58.8	125	55	324
123 30	5 13.29	4 40.3	5 13.36	4 38.4	5 13.43	4 36.5	4 57.3	125	55	323
124 00	5 14.80	4 39.4	5 14.88	4 37.6	5 14.95	4 35.7	4 55.7	124	54	322
124 30	5 16.30	4 39.0	5 16.37	4 37.1	5 16.45	4 35.2	4 54.0	124	54	321
-125 00	5 17.77	- 4 38.9	5 17.85	- 4 37.0	5 17.93	- 4 35.1	4 52.3	124	53	320
125 30	5 19.23	4 39.1	5 19.31	4 37.3	5 19.39	4 35.4	4 50.5	123	53	319
126 00	5 20.67	4 39.8	5 20.75	4 37.9	5 20.83	4 36.1	4 48.7	123	52	318
126 30	5 22.09	4 40.8	5 22.17	4 39.0	5 22.25	4 37.1	4 46.8	122	52	317
127 00	5 23.49	4 42.2	5 23.57	4 40.4	5 23.66	4 38.6	4 44.9	122	51	317
127 30	5 24.87	4 44.0	5 24.95	4 42.2	5 25.04	4 40.3	4 42.9	122	50	316
128 00	5 26.23	4 46.1	5 26.31	4 44.3	5 26.40	4 42.5	4 40.9	121	50	315
128 30	5 27.57	4 48.6	5 27.66	4 46.7	5 27.75	4 44.9	4 38.9	121	49	314
129 00	5 28.89	4 51.3	5 28.98	4 49.5	5 29.07	4 47.7	4 36.8	120	49	314
129 30	5 30.19	4 54.5	5 30.28	4 52.7	5 30.37	4 50.9	4 34.7	120	48	313

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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PATH OF THE CENTRAL LINE

Longitude	Surface		20,000 Ft.		40,000 Ft.		Maximum Duration	Path Width	Sun's	
	U.T.		U.T.		U.T.				Alt.	Az.
	h	m	h	m	h	m				
Latitude	°	'	Latitude	°	'	Latitude	°	'	°	'
-130 00	5 31.47	- 4 57.9	5 31.56	- 4 56.1	5 31.66	- 4 54.4	4 32.5	119	47	312
130 30	5 32.73	5 01.7	5 32.82	4 59.9	5 32.92	4 58.2	4 30.3	119	47	312
131 00	5 33.96	5 05.8	5 34.06	5 04.0	5 34.16	5 02.3	4 28.2	118	46	311
131 30	5 35.18	5 10.2	5 35.28	5 08.4	5 35.38	5 06.7	4 25.9	118	45	311
132 00	5 36.38	5 14.8	5 36.48	5 13.1	5 36.58	5 11.4	4 23.7	117	45	310
132 30	5 37.55	5 19.8	5 37.66	5 18.1	5 37.76	5 16.4	4 21.5	117	44	310
133 00	5 38.71	5 25.1	5 38.81	5 23.4	5 38.91	5 21.6	4 19.2	116	43	309
133 30	5 39.84	5 30.6	5 39.95	5 28.9	5 40.05	5 27.2	4 17.0	116	43	309
134 00	5 40.95	5 36.4	5 41.06	5 34.7	5 41.17	5 33.0	4 14.7	115	42	308
134 30	5 42.05	5 42.5	5 42.15	5 40.8	5 42.26	5 39.1	4 12.4	115	41	308
-135 00	5 43.12	- 5 48.8	5 43.22	- 5 47.1	5 43.33	- 5 45.5	4 10.2	114	41	307
135 30	5 44.17	5 55.4	5 44.28	5 53.7	5 44.38	5 52.0	4 07.9	114	40	307
136 00	5 45.20	6 02.2	5 45.31	6 00.5	5 45.42	5 58.9	4 05.6	113	39	307
136 30	5 46.20	6 09.2	5 46.31	6 07.6	5 46.43	6 06.0	4 03.3	113	39	306
137 00	5 47.19	6 16.5	5 47.30	6 14.9	5 47.41	6 13.3	4 01.1	112	38	306
137 30	5 48.16	6 24.0	5 48.27	6 22.4	5 48.38	6 20.8	3 58.8	112	37	306
138 00	5 49.10	6 31.8	5 49.22	6 30.1	5 49.33	6 28.5	3 56.6	111	37	305
138 30	5 50.03	6 39.7	5 50.14	6 38.1	5 50.26	6 36.5	3 54.3	111	36	305
139 00	5 50.93	6 47.8	5 51.05	6 46.3	5 51.16	6 44.7	3 52.1	110	35	305
139 30	5 51.82	6 56.2	5 51.93	6 54.6	5 52.05	6 53.0	3 49.9	109	35	304
-140 00	5 52.68	- 7 04.7	5 52.80	- 7 03.2	5 52.92	- 7 01.6	3 47.7	109	34	304
140 30	5 53.53	7 13.5	5 53.64	7 11.9	5 53.76	7 10.3	3 45.5	108	33	304
141 00	5 54.35	7 22.4	5 54.47	7 20.8	5 54.59	7 19.3	3 43.3	108	33	303
141 30	5 55.16	7 31.5	5 55.27	7 29.9	5 55.39	7 28.4	3 41.1	107	32	303
142 00	5 55.94	7 40.7	5 56.06	7 39.2	5 56.18	7 37.7	3 39.0	107	31	303
142 30	5 56.71	7 50.2	5 56.83	7 48.6	5 56.95	7 47.1	3 36.8	106	31	303
143 00	5 57.45	7 59.7	5 57.57	7 58.2	5 57.69	7 56.7	3 34.7	106	30	303
143 30	5 58.18	8 09.5	5 58.30	8 08.0	5 58.42	8 06.5	3 32.6	105	29	302
144 00	5 58.89	8 19.4	5 59.01	8 17.9	5 59.13	8 16.4	3 30.5	105	29	302
144 30	5 59.58	8 29.4	5 59.70	8 27.9	5 59.82	8 26.5	3 28.5	104	28	302
-145 00	6 00.25	- 8 39.6	6 00.37	- 8 38.1	6 00.49	- 8 36.7	3 26.4	104	27	302
145 30	6 00.90	8 49.9	6 01.02	8 48.5	6 01.14	8 47.0	3 24.4	103	27	301
146 00	6 01.54	9 00.4	6 01.66	8 58.9	6 01.78	8 57.5	3 22.4	103	26	301
146 30	6 02.15	9 11.0	6 02.27	9 09.5	6 02.39	9 08.1	3 20.4	102	25	301
147 00	6 02.75	9 21.7	6 02.87	9 20.2	6 02.99	9 18.8	3 18.5	102	25	301
147 30	6 03.33	9 32.5	6 03.45	9 31.1	6 03.57	9 29.6	3 16.5	101	24	301
148 00	6 03.89	9 43.4	6 04.01	9 42.0	6 04.14	9 40.6	3 14.6	101	24	301
148 30	6 04.44	9 54.5	6 04.56	9 53.1	6 04.68	9 51.6	3 12.7	101	23	300
149 00	6 04.96	10 05.6	6 05.09	10 04.2	6 05.21	10 02.8	3 10.9	100	22	300
149 30	6 05.48	10 16.9	6 05.60	10 15.5	6 05.72	10 14.1	3 09.0	100	22	300
-150 00	6 05.97	-10 28.3	6 06.09	-10 26.9	6 06.21	-10 25.4	3 07.2	99	21	300
150 30	6 06.45	10 39.7	6 06.57	10 38.3	6 06.69	10 36.9	3 05.4	99	20	300
151 00	6 06.91	10 51.3	6 07.03	10 49.9	6 07.15	10 48.5	3 03.6	98	20	300
151 30	6 07.35	11 02.9	6 07.47	11 01.5	6 07.60	11 00.1	3 01.8	98	19	299
152 00	6 07.78	11 14.6	6 07.90	11 13.2	6 08.02	11 11.8	3 00.1	97	19	299
152 30	6 08.19	11 26.4	6 08.31	11 25.0	6 08.44	11 23.6	2 58.3	97	18	299
153 00	6 08.59	11 38.3	6 08.71	11 36.9	6 08.83	11 35.5	2 56.6	96	17	299
153 30	6 08.97	11 50.2	6 09.09	11 48.8	6 09.21	11 47.5	2 54.9	96	17	299
154 00	6 09.34	12 02.2	6 09.46	12 00.8	6 09.58	11 59.5	2 53.3	96	16	299
-154 30	6 09.69	-12 14.3	6 09.81	-12 12.9	6 09.93	-12 11.6	2 51.6	95	16	298

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Central Line			First Contact			Second Contact		
U.T.	Latitude	Longitude	U.T.	P	V	U.T.	P	V
h m	° '	° '	h m s	°	°	h m s	°	°
3 12	-33 12.3	- 66 32.3		...	...	3 10 47.0	69	199
3 14	30 17.7	72 09.0	2 10 27.7	249	12	3 12 39.9	68	199
3 16	28 24.3	75 33.7	2 10 38.7	248	12	3 14 35.0	68	199
3 18	26 53.8	78 10.5	2 11 07.2	248	11	3 16 30.9	68	199
3 20	-25 36.7	- 80 20.4	2 11 45.5	248	11	3 18 27.2	67	199
3 25	22 57.8	84 38.3	2 13 46.4	247	10	3 23 19.3	67	200
3 30	-20 48.8	- 88 00.9	2 16 08.6	247	10	3 28 12.4	67	202
3 35	18 58.5	90 50.8	2 18 44.1	246	10	3 33 06.2	66	204
3 40	17 21.7	93 19.2	2 21 29.2	246	11	3 38 00.5	66	206
3 45	15 55.3	95 32.1	2 24 21.8	246	11	3 42 55.2	67	208
3 50	14 37.3	97 33.6	2 27 20.7	246	12	3 47 50.3	67	211
3 55	13 26.4	99 26.4	2 30 25.2	246	13	3 52 45.8	67	214
4 00	-12 21.7	-101 12.4	2 33 34.8	246	14	3 57 41.7	67	217
4 05	11 22.5	102 53.1	2 36 49.6	246	15	4 02 38.0	68	221
4 10	10 28.2	104 29.6	2 40 09.3	247	17	4 07 34.6	68	225
4 15	9 38.4	106 02.9	2 43 34.2	247	19	4 12 31.5	69	230
4 20	8 52.9	107 33.7	2 47 04.4	247	21	4 17 28.9	70	235
4 25	8 11.4	109 02.8	2 50 40.4	248	23	4 22 26.7	70	240
4 30	- 7 33.8	-110 30.5	2 54 22.5	248	26	4 27 24.9	71	246
4 35	6 59.8	111 57.6	2 58 11.2	249	29	4 32 23.5	72	252
4 40	6 29.5	113 24.4	3 02 07.2	249	32	4 37 22.6	73	259
4 45	6 02.8	114 51.4	3 06 11.2	250	36	4 42 22.2	74	265
4 50	5 39.6	116 19.1	3 10 23.9	251	40	4 47 22.2	74	271
4 55	5 20.0	117 47.9	3 14 46.2	251	45	4 52 22.7	75	278
5 00	- 5 04.1	-119 18.2	3 19 19.1	252	51	4 57 23.7	76	284
5 05	4 51.9	120 50.6	3 24 03.7	253	57	5 02 25.2	77	290
5 10	4 43.5	122 25.6	3 29 01.1	254	63	5 07 27.1	78	295
5 15	4 39.3	124 03.9	3 34 12.4	255	70	5 12 29.6	79	300
5 20	4 39.4	125 46.0	3 39 39.1	256	78	5 17 32.5	80	305
5 25	4 44.1	127 32.9	3 45 22.3	257	86	5 22 36.0	81	310
5 30	- 4 54.0	-129 25.6	3 51 23.6	258	94	5 27 39.9	82	314
5 35	5 09.4	131 25.5	3 57 44.2	260	102	5 32 44.2	83	318
5 40	5 31.4	133 34.2	4 04 25.8	261	109	5 37 49.1	84	322
5 45	6 00.8	135 54.2	4 11 29.9	262	117	5 42 54.5	85	325
5 50	6 39.4	138 29.0	4 18 58.5	263	124	5 48 00.4	86	328
5 55	7 29.6	141 24.0	4 26 54.6	264	130	5 53 06.9	87	331
6 00	- 8 35.7	-144 48.7	4 35 23.1	266	136	5 58 14.2	88	334
6 05	10 06.4	-149 02.0	4 44 34.3	267	141	6 03 22.5	88	336
6 10	-12 25.5	-154 57.9	4 54 59.5	268	147	6 08 33.0	89	338
6 12	13 54.5	-158 33.6	4 59 56.9	269	149	6 10 38.6	89	339
6 14	-17 01.0	-165 51.8	5 07 10.6	269	152	6 12 48.5	90	340

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Maximum Eclipse					Sun's		Third Contact					Fourth Contact					Path		
U.T.			Maximum	Magnitude	Alt.	Az.	U.T.			P	V	U.T.			P	V	Duration	Width	
h	m	s	%		°	°	h	m	s	°	°	h	m	s	°	°	m	s	km
3	12	00.0	100.0	1.019	6	57	3	13	13.4	249	19	4	19	48.7	69	208	2	26.4	138
3	14	00.0	100.0	1.020	12	54	3	15	20.6	248	19	4	25	23.5	68	209	2	40.6	144
3	16	00.0	100.0	1.021	16	52	3	17	25.5	248	19	4	29	52.1	68	211	2	50.5	148
3	18	00.0	100.0	1.021	19	50	3	19	29.7	248	19	4	33	55.8	67	213	2	58.7	151
3	20	00.0	100.0	1.022	22	49	3	21	33.4	247	20	4	37	45.0	67	215	3	06.1	153
3	25	00.0	100.0	1.023	27	46	3	26	41.4	247	21	4	46	39.0	67	219	3	22.1	159
3	30	00.0	100.0	1.023	32	43	3	31	48.4	247	23	4	54	56.7	67	224	3	35.9	164
3	35	00.0	100.0	1.024	36	41	3	36	54.6	247	25	5	02	48.8	67	229	3	48.4	168
3	40	00.0	100.0	1.024	39	38	3	42	00.4	247	27	5	10	19.6	68	235	3	59.9	172
3	45	00.0	100.0	1.025	42	36	3	47	05.6	247	29	5	17	31.6	68	241	4	10.4	175
3	50	00.0	100.0	1.025	45	33	3	52	10.5	247	32	5	24	26.1	69	247	4	20.1	178
3	55	00.0	100.0	1.025	48	30	3	57	15.0	247	36	5	31	03.9	70	253	4	29.1	182
4	00	00.0	100.0	1.026	50	27	4	02	19.1	248	39	5	37	25.5	70	260	4	37.3	185
4	05	00.0	100.0	1.026	52	24	4	07	22.8	248	43	5	43	31.5	71	266	4	44.8	187
4	10	00.0	100.0	1.026	54	20	4	12	26.1	249	47	5	49	22.1	72	272	4	51.5	190
4	15	00.0	100.0	1.026	56	17	4	17	29.1	249	52	5	54	58.0	73	278	4	57.5	192
4	20	00.0	100.0	1.026	57	12	4	22	31.6	250	57	6	00	19.6	74	284	5	02.7	195
4	25	00.0	100.0	1.026	58	8	4	27	33.7	250	63	6	05	27.5	74	290	5	07.0	197
4	30	00.0	100.0	1.026	59	3	4	32	35.4	251	69	6	10	22.3	75	295	5	10.5	199
4	35	00.0	100.0	1.027	60	-1	4	37	36.7	252	75	6	15	04.7	76	299	5	13.1	200
4	40	00.0	100.0	1.027	60	-6	4	42	37.5	253	81	6	19	35.2	77	304	5	14.8	202
4	45	00.0	100.0	1.027	60	-11	4	47	37.8	254	88	6	23	54.6	78	308	5	15.6	203
4	50	00.0	100.0	1.027	60	-16	4	52	37.6	255	94	6	28	03.5	79	312	5	15.4	203
4	55	00.0	100.0	1.027	59	-21	4	57	37.0	256	100	6	32	02.5	80	315	5	14.3	203
5	00	00.0	100.0	1.027	59	-25	5	02	35.9	257	106	6	35	52.3	81	319	5	12.2	203
5	05	00.0	100.0	1.026	57	-29	5	07	34.3	258	112	6	39	33.5	81	322	5	09.1	202
5	10	00.0	100.0	1.026	56	-33	5	12	32.2	259	117	6	43	06.6	82	325	5	05.0	201
5	15	00.0	100.0	1.026	54	-37	5	17	29.7	260	122	6	46	31.9	83	327	5	00.0	200
5	20	00.0	100.0	1.026	52	-40	5	22	26.7	261	127	6	49	50.0	84	330	4	54.1	198
5	25	00.0	100.0	1.026	50	-43	5	27	23.2	262	131	6	53	01.1	85	332	4	47.2	196
5	30	00.0	100.0	1.026	48	-46	5	32	19.2	263	135	6	56	05.3	85	334	4	39.3	193
5	35	00.0	100.0	1.025	45	-48	5	37	14.8	263	139	6	59	02.6	86	336	4	30.5	190
5	40	00.0	100.0	1.025	43	-50	5	42	09.9	264	143	7	01	52.9	87	338	4	20.8	186
5	45	00.0	100.0	1.025	39	-52	5	47	04.6	265	146	7	04	35.6	87	340	4	10.1	182
5	50	00.0	100.0	1.024	36	-54	5	51	58.7	266	149	7	07	09.8	88	341	3	58.3	178
5	55	00.0	100.0	1.024	32	-56	5	56	52.2	267	152	7	09	33.5	88	343	3	45.3	173
6	00	00.0	100.0	1.023	28	-57	6	01	45.0	268	154	7	11	43.2	89	344	3	30.8	167
6	05	00.0	100.0	1.022	22	-59	6	06	36.7	269	156	7	13	31.2	89	345	3	14.2	161
6	10	00.0	100.0	1.021	15	-61	6	11	26.4	269	159	7	14	35.5	90	346	2	53.3	152
6	12	00.0	100.0	1.021	11	-62	6	13	20.8	269	159	..	..	..	...	...	2	42.1	148
6	14	00.0	100.0	1.019	3	-64	6	15	11.0	270	160	..	..	..	...	...	2	22.4	138

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

LOCAL CIRCUMSTANCES FOR GEOGRAPHIC LOCATIONS

	Position		First Contact				Second Contact					
	Latitude	Longitude	U.T.			P	V	U.T.			P	V
			h	m	s			h	m	s		
Indonesia												
Bandung, Java	- 6 57.0	-107 34.0	2 48	40.5		244	16					
Bandar Seri Begawan, Brunei	- 4 56.0	-114 58.0	3 07	26.9		248	34					
Bandjarmasin, Borneo	- 3 22.0	-114 33.0	3 07	58.1		246	29					
Banda Aceh, Sumatra	+ 5 30.0	- 95 20.0	2 54	50.8		211	318					
Bangil, Java	- 7 36.0	-112 46.0	2 59	40.4		250	33	4 36	00.3		140	324
Bangkalan, Madura I.	- 7 02.0	-112 44.0	3 00	01.3		250	31	4 34	55.4		91	274
Bengkulu, Sumatra	- 3 46.0	-102 16.0	2 43	19.5		234	356					
Blora, Java	- 6 57.0	-111 25.0	2 56	56.8		248	27	4 30	50.2		56	235
Bluto, Madura I.	- 7 07.0	-113 48.0	3 02	37.0		251	35	4 39	04.5		124	312
Bodjanegoro, Java	- 7 09.0	-111 53.0	2 57	52.9		249	29	4 32	02.4		79	259
Bojolali, Java	- 7 32.0	-110 35.0	2 54	33.9		248	26	4 27	40.0		71	246
Bosscha Observatory, Lembang, Java	- 6 50.0	-107 37.0	2 48	51.6		244	16					
Brebes, Java	- 6 54.0	-109 02.0	2 51	42.6		246	20					
Denpasar, Bali	- 8 40.0	-115 14.0	3 05	20.6		254	43					
Dili, Lesser Sunda I.	- 8 35.0	-125 35.0	3 36	52.9		262	82					
Djambi (Telanaipura), Sumatra	- 1 36.0	-103 39.0	2 48	29.7		232	354					
Garut, Java	- 7 13.0	-107 55.0	2 49	07.9		245	18					
Gresik, Java	- 7 10.0	-112 39.0	2 59	42.8		250	31	4 34	39.6		98	281
Jakarta, Java	- 6 08.0	-106 45.0	2 47	53.5		242	12					
Jogjakarta, Java	- 7 48.0	-110 24.0	2 53	56.6		248	26	4 26	55.3		82	257
Kebumen, Java	- 7 40.0	-109 40.0	2 52	25.3		248	24	4 24	51.3		56	228
Kediri, Java	- 7 49.0	-112 01.0	2 57	41.5		250	31	4 33	09.5		132	313
Kendari, Sulawesi	- 3 57.0	-122 36.0	3 30	10.5		253	63	5 09	39.3		21	240
Klaten, Java	- 7 43.0	-110 36.0	2 54	27.6		249	26	4 27	36.3		82	258
Kotaburu (Jayapura), West Irian	- 2 37.0	-140 39.0	4 27	41.1		257	127					
Kota Kinabalu, Sabah	+ 5 59.0	-116 04.0	3 26	05.3		232	15					
Krakatau I.	- 6 11.0	-105 26.0	2 45	26.8		241	9					
Kuching, Sarawak	+ 1 32.0	-110 20.0	3 05	15.4		234	4					
Kudus, Java	- 6 48.0	-110 50.0	2 55	44.0		247	25	4 29	42.8		31	207
Kupang, Lesser Sunda I.	-10 13.0	-123 38.0	3 29	57.2		263	77					
Lamongan, Java	- 7 07.0	-112 25.0	2 59	11.1		249	30	4 33	49.8		89	271
Lasem, Java	- 6 42.0	-111 26.0	2 57	11.7		248	26	4 31	23.4		41	220
Lombok, Lesser Sunda I.	- 8 29.0	-116 40.0	3 09	23.8		255	47					
Makassar, (Ujung Pandang), Sulawesi	- 5 09.0	-119 25.0	3 19	34.8		253	51	4 57	42.3		83	290
Malang, Java	- 7 59.0	-112 38.0	2 59	04.2		251	33					
Manado, Sulawesi	+ 1 32.0	-124 55.0	3 43	06.3		246	68					
Mataram, Lesser Sunda I.	- 8 36.0	-116 07.0	3 07	47.8		255	46					
Medan, Sumatra	+ 3 35.0	- 98 39.0	2 52	27.1		218	330					
Modjokerto, Java	- 7 28.0	-112 26.0	2 58	57.4		250	31	4 34	07.1		114	296
Padang, Sumatra	- 1 00.0	-100 21.0	2 45	04.8		228	345					
Palangkaraya, Borneo	- 2 06.0	-113 55.0	3 07	52.6		243	24					
Palembang, Sumatra	- 2 59.0	-104 45.0	2 48	10.2		235	360					
Palu, Sulawesi	- 0 54.0	-119 52.0	3 25	06.7		246	46					
Pasuruan, Java	- 7 39.0	-112 54.0	2 59	57.9		251	33					
Pati, Java	- 6 45.0	-111 02.0	2 56	13.9		248	25	4 30	18.5		33	210
Patjitan, Java	- 8 12.0	-111 12.0	2 55	28.9		250	29	4 30	41.0		142	320
Pekalongan, Java	- 6 53.0	-109 40.0	2 53	04.6		246	22					
Pekanbaru, Sumatra	+ 0 33.0	-101 30.0	2 49	13.5		226	344					
Pemalang, Java	- 6 53.0	-109 22.0	2 52	25.9		246	21					
Ponorogo, Java	- 7 51.0	-111 37.0	2 56	42.9		250	30	4 31	26.6		120	299
Pontianak, Borneo	- 0 05.0	-109 16.0	3 00	30.3		235	5					
Purbolinggo, Java	- 7 24.0	-109 20.0	2 51	55.1		247	22	4 24	41.7		27	199

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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LOCAL CIRCUMSTANCES FOR GEOGRAPHIC LOCATIONS

					Maximum Eclipse		Third Contact					Fourth Contact							Path
U.T.			Maximum	Magnitude	Sun's		U.T.			P	V	U.T.			P	V	Duration		Width
h	m	s	%		Alt.	Az.	h	m	s	°	°	h	m	s	°	°	m	s	km
4	21	45.5	97.6	0.973	59	12						6	01	58.4	77	289			
4	46	17.4	99.7	0.994	61	-12						6	24	56.4	80	311			
4	46	18.1	94.6	0.948	63	-12						6	24	38.7	82	315			
4	04	06.7	32.5	0.434	61	50						5	20	42.9	103	269			
4	37	00.2	100.0	1.002	59	-3	4	38	00.2	185	10	6	16	52.7	75	299	1	59.9	202
4	37	23.7	100.0	1.018	60	-3	4	39	52.2	234	59	6	17	15.6	76	301	4	56.8	201
4	10	18.2	77.2	0.811	59	28						5	46	50.3	83	283			
4	33	20.9	100.0	1.020	60	0	4	35	51.8	267	88	6	13	32.4	76	298	5	01.6	199
4	40	42.3	100.0	1.006	60	-7	4	42	20.3	202	30	6	20	11.2	76	303	3	15.8	203
4	34	37.4	100.0	1.023	60	0	4	37	12.7	245	67	6	14	43.8	76	299	5	10.3	200
4	30	15.2	100.0	1.026	59	3	4	32	50.7	251	69	6	10	36.9	75	295	5	10.6	199
4	22	00.1	97.3	0.970	59	12						6	02	13.5	77	290			
4	26	07.7	99.3	0.989	60	8						6	06	29.9	76	293			
4	43	59.6	95.0	0.951	58	-10						6	22	43.8	74	301			
5	17	01.3	90.3	0.914	50	-36						6	47	04.6	77	319			
4	16	06.3	72.2	0.771	63	25						5	52	06.7	86	293			
4	22	32.1	98.8	0.983	59	11						6	02	50.6	76	290			
4	37	00.9	100.0	1.015	60	-3	4	39	22.4	227	52	6	16	54.8	76	300	4	42.7	201
4	20	10.0	93.7	0.941	60	15						6	00	01.7	78	290			
4	29	27.1	100.0	1.021	59	4	4	31	59.3	240	57	6	09	50.7	75	294	5	04.0	199
4	27	20.3	100.0	1.020	59	6	4	29	49.7	266	80	6	07	46.7	75	292	4	58.3	197
4	34	27.1	100.0	1.004	59	0	4	35	44.8	192	14	6	14	32.8	75	297	2	35.2	201
5	11	01.9	100.0	1.004	56	-35	5	12	24.0	316	176	6	43	49.2	84	327	2	44.7	200
4	30	08.4	100.0	1.021	59	3	4	32	40.9	240	58	6	10	30.5	75	294	5	04.5	199
5	55	11.2	86.8	0.886	35	-58						7	09	26.6	96	355			
4	58	11.7	60.9	0.680	70	-29						6	27	55.7	99	346			
4	16	24.8	91.6	0.924	59	19						5	55	50.5	78	286			
4	37	54.1	71.6	0.766	68	0						6	13	39.4	90	321			
4	31	40.8	100.0	1.009	60	2	4	33	39.1	292	111	6	11	57.1	77	298	3	56.2	198
5	09	54.9	84.8	0.870	51	-31						6	41	35.1	74	311			
4	36	19.5	100.0	1.019	60	-2	4	38	49.3	235	60	6	16	17.4	76	300	4	59.5	201
4	33	37.4	100.0	1.013	60	0	4	35	51.7	283	104	6	13	47.2	77	299	4	28.3	199
4	48	48.2	94.3	0.945	57	-14						6	26	42.1	74	304			
5	00	17.6	100.0	1.024	58	-25	5	02	52.5	251	100	6	36	05.5	81	319	5	10.2	203
4	36	14.9	99.5	0.991	59	-2						6	16	09.7	75	298			
5	20	45.9	81.2	0.842	57	-46						6	48	51.3	94	346			
4	46	55.0	94.3	0.946	57	-13						6	25	09.0	74	303			
4	09	17.9	44.8	0.545	63	42						5	34	13.9	97	284			
4	36	04.1	100.0	1.009	59	-2	4	38	01.4	211	35	6	16	02.7	75	299	3	54.3	201
4	08	20.7	63.7	0.703	61	34						5	41	01.9	88	282			
4	45	24.7	89.5	0.907	64	-11						6	23	24.7	84	318			
4	17	39.0	79.1	0.826	62	21						5	55	19.1	83	292			
5	04	42.7	89.5	0.907	61	-31						6	38	39.0	88	331			
4	37	22.9	99.9	0.995	59	-3						6	17	12.8	75	300			
4	32	20.5	100.0	1.010	60	1	4	34	22.8	290	110	6	12	34.8	77	298	4	04.3	199
4	31	33.9	100.0	1.002	59	1	4	32	26.9	181		6	11	50.3	74	294	1	45.8	200
4	28	02.8	99.8	0.994	60	6						6	08	25.2	76	295			
4	12	50.0	60.5	0.677	63	32						5	45	02.1	91	290			
4	27	08.6	99.6	0.991	60	7						6	07	31.1	76	294			
4	33	10.3	100.0	1.007	59	0	4	34	54.1	203	24	6	13	21.8	75	296	3	27.4	201
4	33	15.9	76.1	0.802	67	5						6	10	22.8	88	313			
4	26	34.4	100.0	1.008	59	7	4	28	27.4	294	107	6	07	00.1	76	292	3	45.7	197

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

LOCAL CIRCUMSTANCES FOR GEOGRAPHIC LOCATIONS

	Position		First Contact			Second Contact		
	Latitude ° ' "	Longitude ° ' "	U.T. h m s	P °	V °	U.T. h m s	P °	V °
Indonesia (Cont.)								
Purwokerto, Java	- 7 26.0	-109 15.0	2 51 42.7	247	22	4 24 25.4	27	198
Rantjah, Java	- 7 12.0	-108 30.0	2 50 20.0	246	19			
Rembang, Java	- 6 42.0	-111 21.0	2 57 00.1	248	26	4 31 11.1	38	217
Salatiga, Java	- 7 17.0	-110 29.0	2 54 32.4	248	25	4 27 42.2	54	229
Samarinda, Borneo	- 0 30.0	-117 09.0	3 18 07.2	243	33			
Semarang, Java	- 6 58.0	-110 25.0	2 54 39.2	247	24	4 28 17.7	30	205
Sumenep, Madura I.	- 7 01.0	-113 52.0	3 02 51.7	251	35	4 39 08.1	117	305
Surakarta, Java	- 7 35.0	-110 50.0	2 55 05.7	249	27	4 28 25.2	80	256
Surabaya, Java	- 7 14.0	-112 45.0	2 59 54.4	250	32	4 35 04.2	105	288
Tandjungkarang, Sumatra	- 5 22.0	-105 18.0	2 46 06.0	240	7			
Tasikmalaja, Java	- 7 20.0	-108 13.0	2 49 38.2	246	19			
Tegal, Java	- 6 52.0	-109 07.0	2 51 54.9	246	20			
Tjepu, Java	- 7 09.0	-111 35.0	2 57 10.4	249	28	4 31 05.2	72	251
Tjiawi, Java	- 7 10.0	-108 09.0	2 49 38.8	245	18			
Tjidjulung, Java	- 7 44.0	-108 28.0	2 49 48.9	247	20	4 21 58.1	22	191
Tuban, Java	- 6 53.0	-112 02.0	2 58 27.2	249	29	4 32 43.8	67	247
Other Countries								
Adelaide, S. Australia	-34 56.0	-138 36.0	4 21 42.6	304	146			
Bickley, Perth Obs., W. Australia	-32 00.0	-116 08.0	3 16 39.4	289	94			
Brisbane, Queensland	-27 30.0	-153 00.0	4 46 52.4	291	154			
Canberra, A.C.T.	-35 18.0	-149 08.0	4 40 29.0	302	156			
Darwin, N. Territory	-12 23.0	-130 44.0	3 52 59.6	270	106			
Hobart, Tasmania	-42 54.0	-147 18.0	4 38 00.5	312	159			
Melbourne, Victoria	-37 45.0	-144 58.0	4 34 19.8	306	155			
Mt. Stromlo Obs., A.C.T.	-35 19.0	-149 00.0	4 40 18.8	302	156			
Perth, W. Australia	-31 58.0	-115 49.0	3 15 41.2	289	94			
Riverview C.O., Lane Cove, N.S.W.	-33 50.0	-151 10.0	4 43 24.5	300	156			
Siding Spring, N.S.W.	-31 17.0	-149 04.0	4 40 30.7	297	154			
Sydney Obs., Sydney, N.S.W.	-33 52.0	-151 12.0	4 43 27.0	300	156			
Rangoon, Burma	+16 47.0	- 96 10.0	3 38 28.1	185	283			
Phnom Penh, Cambodia	+11 35.0	-104 55.0	3 20 37.2	210	322			
Agana, Guam	+13 28.0	-144 45.0	5 00 07.5	225	127			
Kowloon, Hong Kong	+22 20.0	-114 15.0	4 16 55.3	194	318			
Kowloon, Royal Observatory	+22 18.0	-114 10.0	4 16 37.4	194	316			
Victoria, Hong Kong	+22 16.0	-114 13.0	4 16 30.0	195	317			
Vientiane, Laos	+17 59.0	-102 38.0	3 44 12.7	193	293			
Kuala Lumpur, Malaysia	+ 3 08.0	-101 42.0	2 54 36.6	222	338			
Ambon, Moluccas	- 3 41.0	-128 10.0	3 48 07.8	256	88			
Daru, Papua New Guinea	- 9 05.0	-143 12.0	4 31 03.2	267	134			
Port Moresby, Papua New Guinea	- 9 29.0	-147 09.0	4 40 37.4	266	139	6 01 13.1	93	340
Baguio City, Manila Obs., Philippines	+16 25.0	-120 35.0	4 03 34.8	215	48			
Manila, Philippines	+14 37.0	-120 58.0	3 58 54.2	219	45			
Quezon City, Manila Obs.	+14 38.0	-121 05.0	3 59 13.9	219	46			
Quezon City, Pagasa Obs.	+14 39.0	-121 04.0	3 59 14.4	219	46			
Singapore	+ 1 22.0	-102 45.0	2 52 21.3	226	345			
Colombo, Sri Lanka	+ 6 55.0	- 79 52.0	3 04 01.2	184	282			
Chung-Li, Natl. Central Obs., Taiwan	+24 58.0	-121 11.0	4 44 15.6	190	111			
Taipei, Taipei Obs., Taiwan	+25 05.0	-121 32.0	4 45 44.9	190	111			
Krung Thep, Thailand	+13 44.0	-100 30.0	3 24 25.8	200	305			
Hanoi, Viet Nam	+21 01.0	-105 52.0	4 02 13.4	188	285			
Saigon, Viet Nam	+10 46.0	-106 43.0	3 20 21.3	214	330			

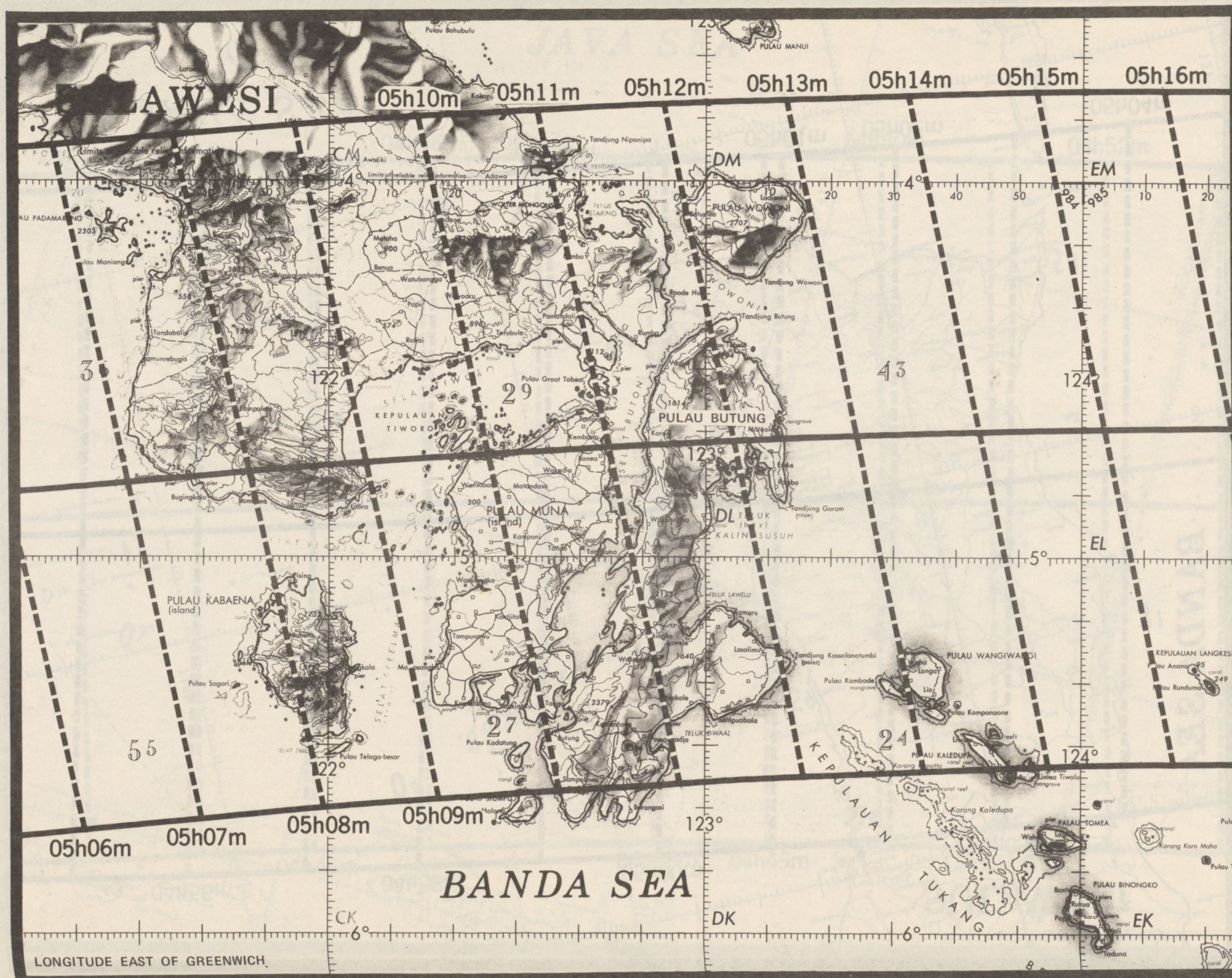
Names and spellings are not authoritative, nor do they imply any official recognition of status.

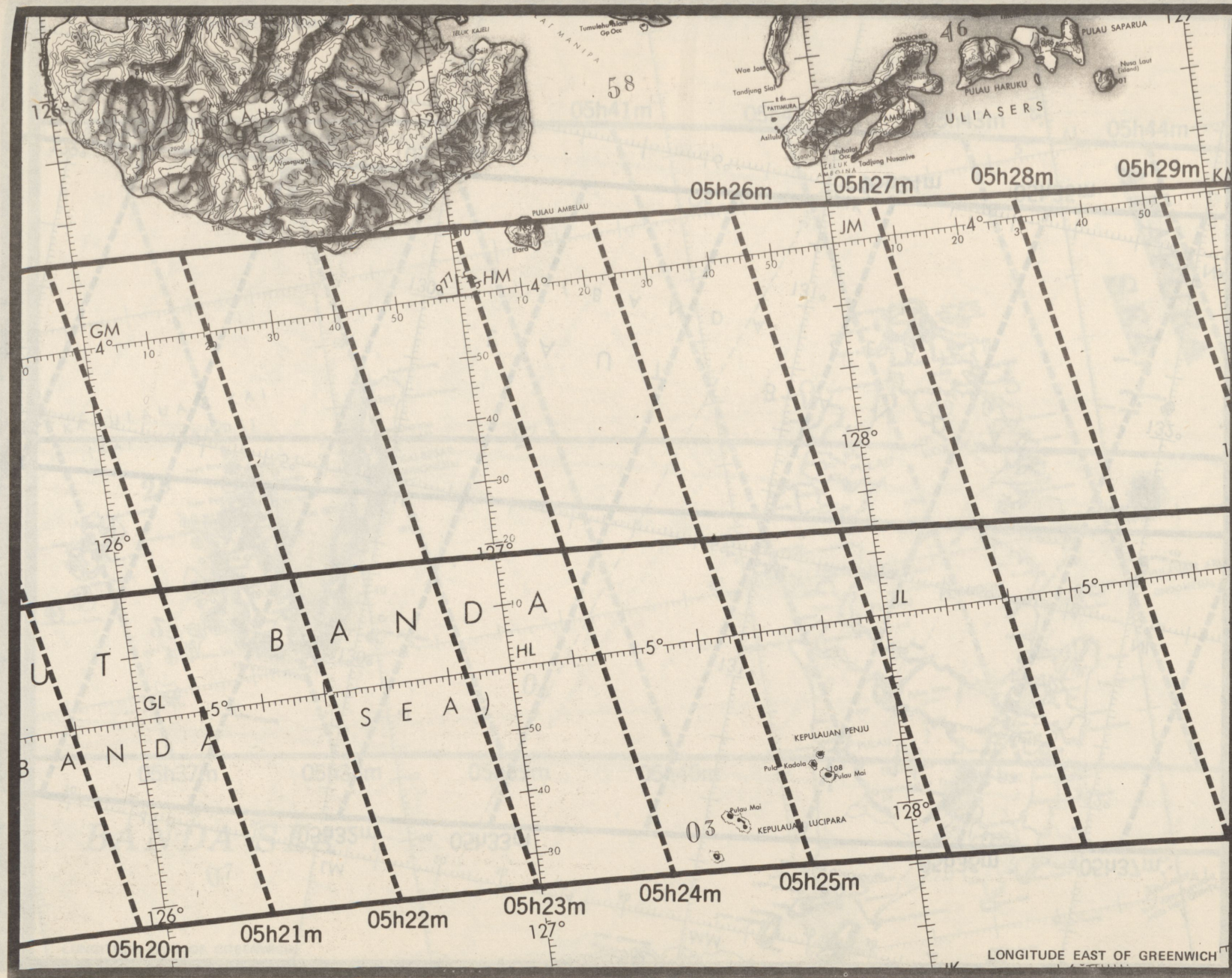
TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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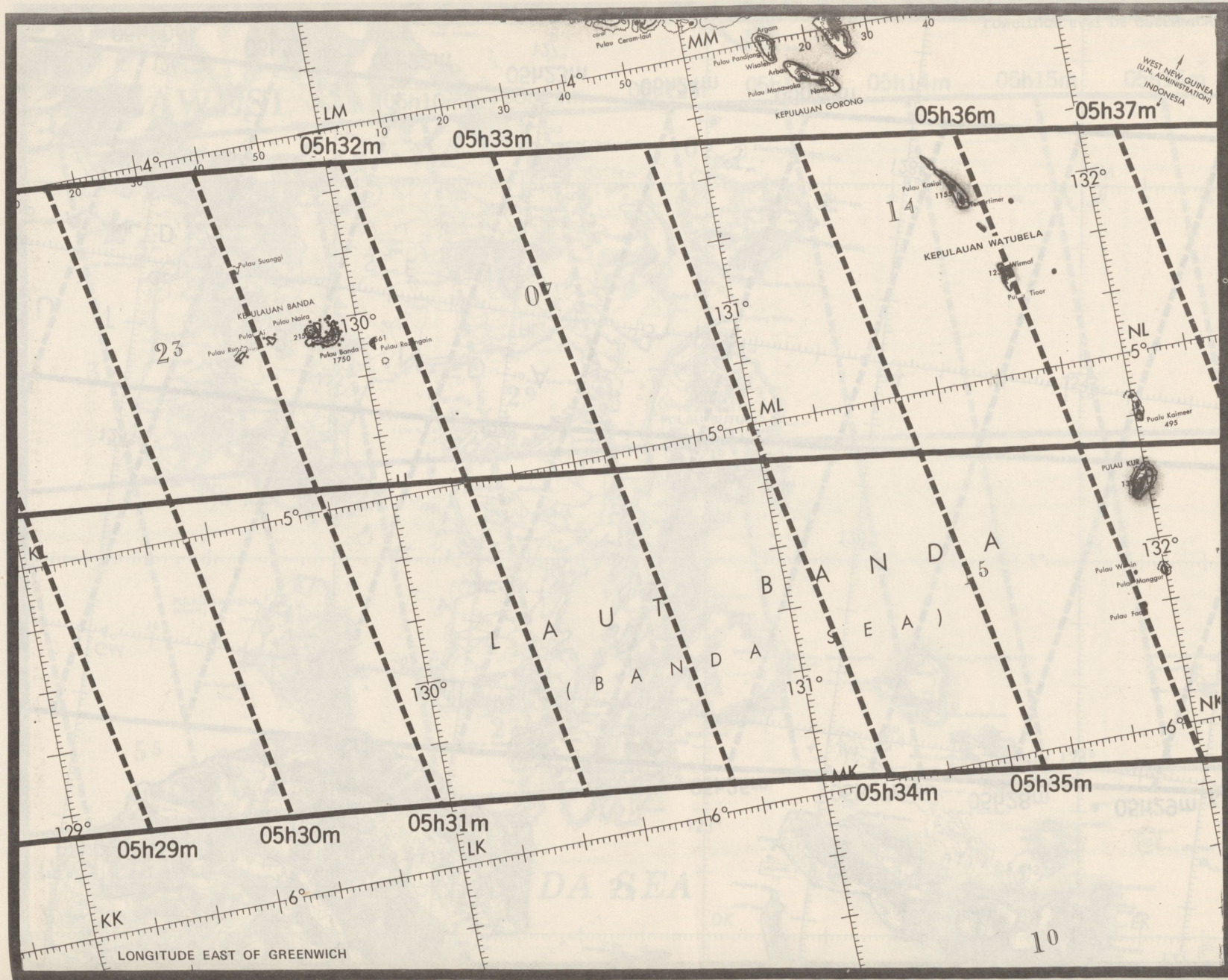
LOCAL CIRCUMSTANCES FOR GEOGRAPHIC LOCATIONS

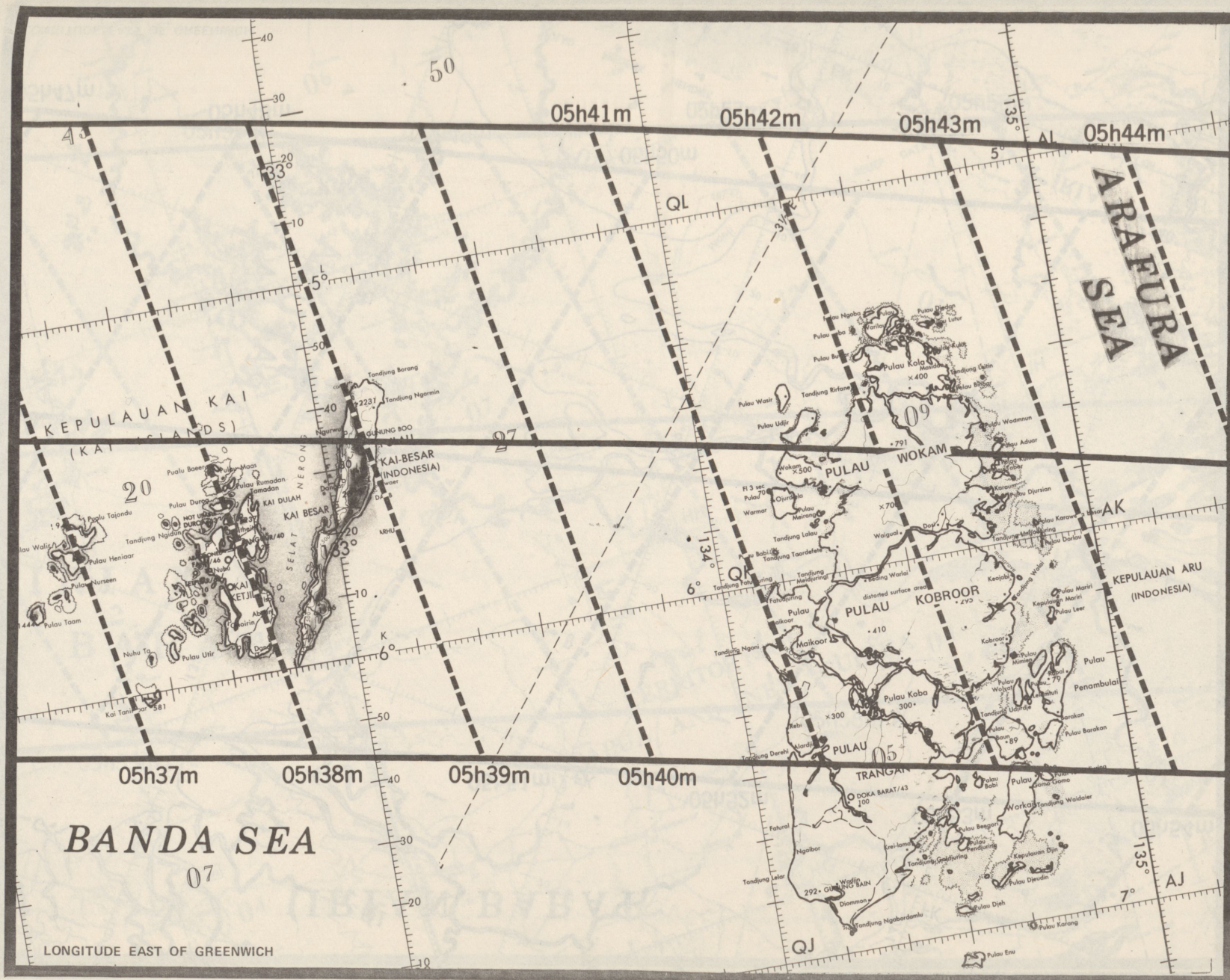
Maximum Eclipse						Third Contact					Fourth Contact					Path Width	
U.T.			Maximum Obscuration %	Magnitude	Sun's Alt. Az.		U.T.		P	V	U.T.		P	V	Duration	Path Width	
h	m	s			°	°	h	m	°	°	h	m	°	°	m	s	km
4	26	17.6	100.0	1.008	59	7	4	28	10.0	294	107	6	06	43.4	76	292	3 44.6 197
4	24	16.1	99.5	0.992	59	10						6	04	38.5	76	291	
4	33	21.9	100.0	1.012	60	0	4	35	32.9	285	106	6	13	32.7	77	299	4 21.7 199
4	30	10.2	100.0	1.019	60	3	4	32	38.7	269	86	6	10	31.8	76	295	4 56.4 198
4	56	41.4	86.4	0.883	64	-24						6	32	14.2	88	328	
4	30	15.1	100.0	1.009	60	3	4	32	12.8	292	109	6	10	35.4	76	296	3 55.1 198
4	41	00.3	100.0	1.008	60	-7	4	42	52.5	209	38	6	20	27.2	76	303	3 44.4 203
4	30	58.7	100.0	1.022	59	2	4	33	32.4	242	61	6	11	18.5	75	295	5 07.2 199
4	37	16.3	100.0	1.012	60	-3	4	39	28.6	220	45	6	17	08.5	76	300	4 24.3 202
4	16	49.3	88.6	0.900	60	19						5	55	56.0	79	288	
4	23	18.6	99.4	0.990	59	10						6	03	40.1	76	290	
4	26	24.5	99.3	0.989	60	8						6	06	46.6	76	293	
4	33	41.3	100.0	1.026	60	0	4	36	17.7	251	73	6	13	51.8	76	298	5 12.5 200
4	23	15.9	98.9	0.985	59	11						6	03	35.9	76	290	
4	23	41.1	100.0	1.007	59	10	4	25	24.3	298	108	6	04	06.0	75	289	3 26.2 195
4	35	19.7	100.0	1.024	60	-1	4	37	55.9	257	81	6	15	22.8	76	300	5 12.0 200
5	25	44.1	23.0	0.342	21	-38						6	24	20.3	43	267	
4	30	25.4	29.8	0.409	35	-3						5	45	02.9	40	243	
5	56	27.8	51.3	0.602	11	-55						• • • • •	• • • • •				
5	42	27.0	28.8	0.400	12	-49						6	38	29.1	49	279	
5	29	05.0	78.2	0.819	42	-42						6	52	55.5	74	316	
5	29	11.3	15.2	0.257	10	-44						6	16	55.8	37	257	
5	33	11.4	21.5	0.326	14	-44						6	27	08.1	43	268	
5	42	15.8	28.6	0.399	12	-49						6	38	17.7	49	279	
4	29	32.3	30.1	0.412	35	-3						5	44	24.5	40	242	
5	46	54.5	33.6	0.446	11	-52						6	43	58.5	53	286	
5	47	30.4	37.5	0.481	14	-51						6	47	12.1	56	290	
5	46	54.3	33.5	0.445	11	-52						6	43	56.2	53	285	
4	19	10.7	5.0	0.120	71	68						5	01	37.4	131	259	
4	33	10.4	28.9	0.400	77	28						5	49	07.7	110	338	
6	00	10.8	23.5	0.347	37	-70						6	54	00.5	130	44	
5	03	05.7	6.4	0.142	81	276						5	48	44.0	137	49	
5	02	54.0	6.4	0.142	81	277						5	48	39.2	137	48	
5	02	59.6	6.5	0.144	81	277						5	48	57.0	137	48	
4	34	14.1	8.6	0.174	80	57						5	25	51.9	128	346	
4	16	07.9	52.0	0.606	66	33						5	45	16.2	95	298	
5	27	13.6	99.4	0.989	50	-45						6	54	24.5	87	336	
5	57	19.7	99.1	0.987	29	-56						7	10	23.7	87	341	
6	02	53.9	100.0	1.021	25	-58	6	04	33.8	263	150	7	12	48.4	89	345	3 20.6 164
5	15	07.5	25.0	0.362	70	-66						6	23	06.8	121	27	
5	15	28.0	31.2	0.422	69	-62						6	27	47.3	117	21	
5	15	45.1	31.1	0.422	69	-62						6	27	59.1	117	21	
5	15	43.0	31.1	0.421	69	-62						6	27	55.1	118	21	
4	16	52.4	60.0	0.673	65	29						5	49	16.2	91	297	
3	38	55.9	4.8	0.118	44	65						4	16	02.1	128	237	
5	18	03.0	2.6	0.078	71	269						5	51	06.5	148	67	
5	18	44.2	2.4	0.074	70	269						5	51	00.8	148	68	
4	25	02.0	16.8	0.275	74	51						5	29	02.5	118	315	
4	44	02.9	4.8	0.117	87	53						5	26	27.9	136	30	
4	36	51.6	33.8	0.447	77	16						5	56	21.4	108	342	



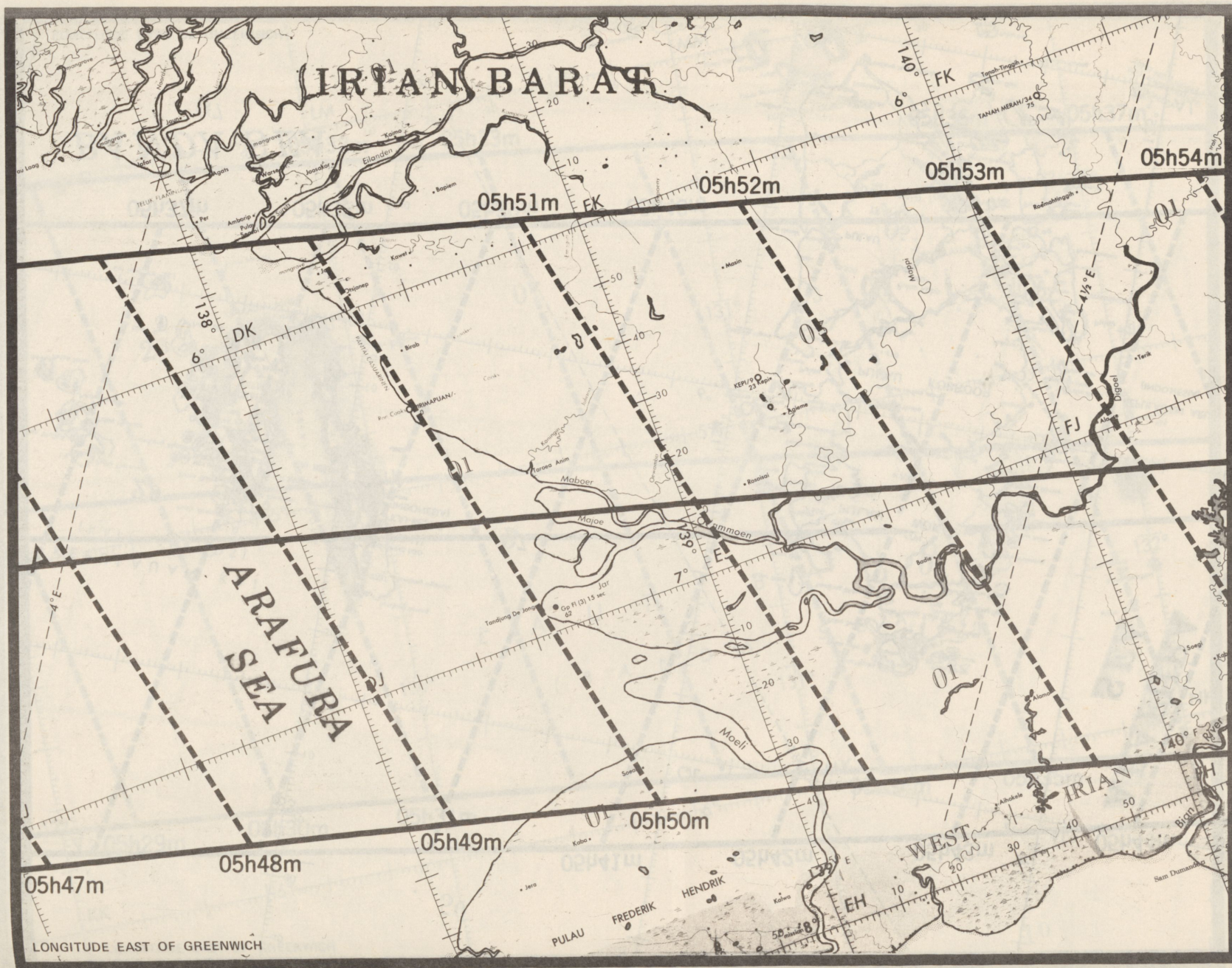


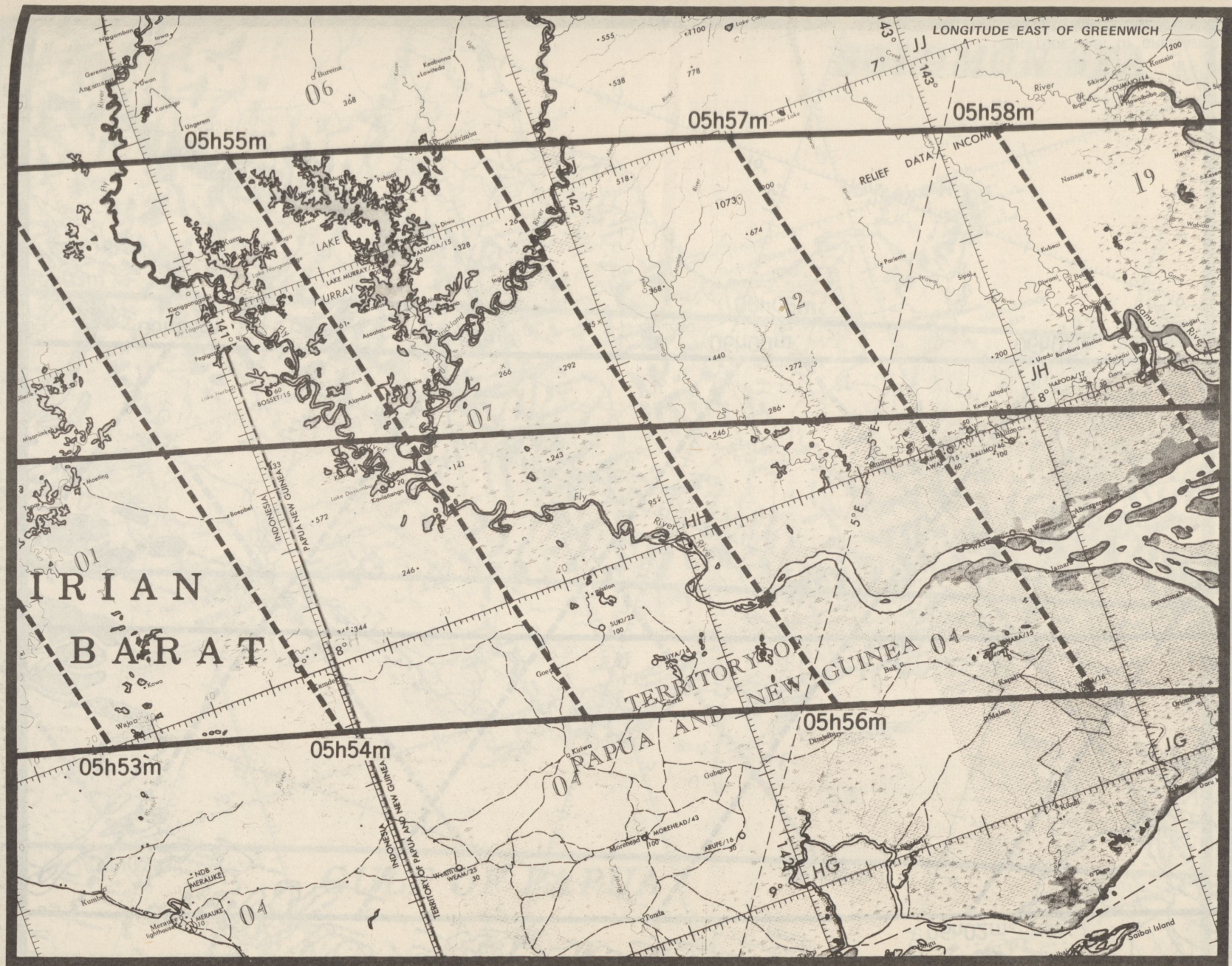
TOTAL SOLAR ECLIPSE OF 11 JUNE 1983



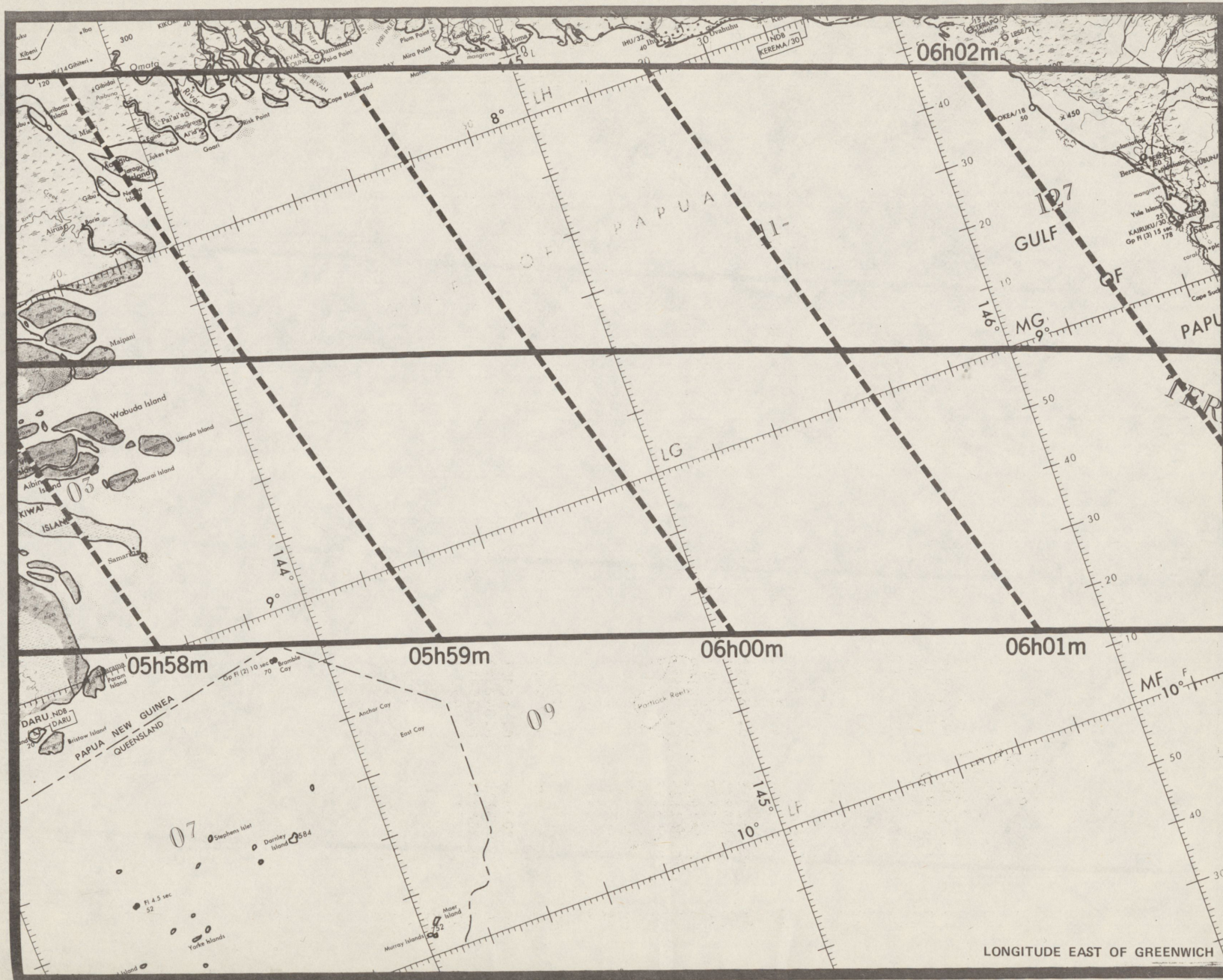


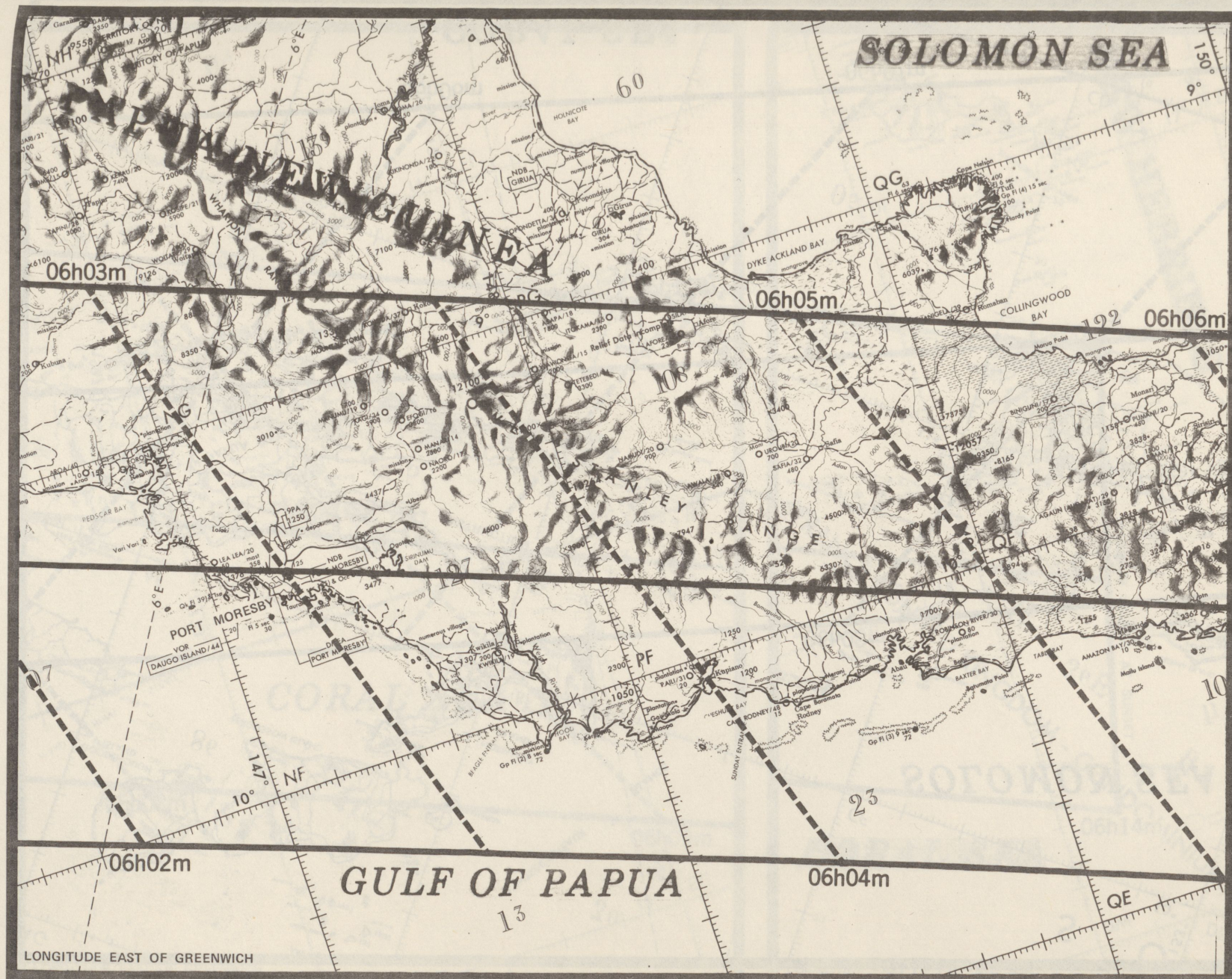
TOTAL SOLAR ECLIPSE OF 11 JUNE 1983



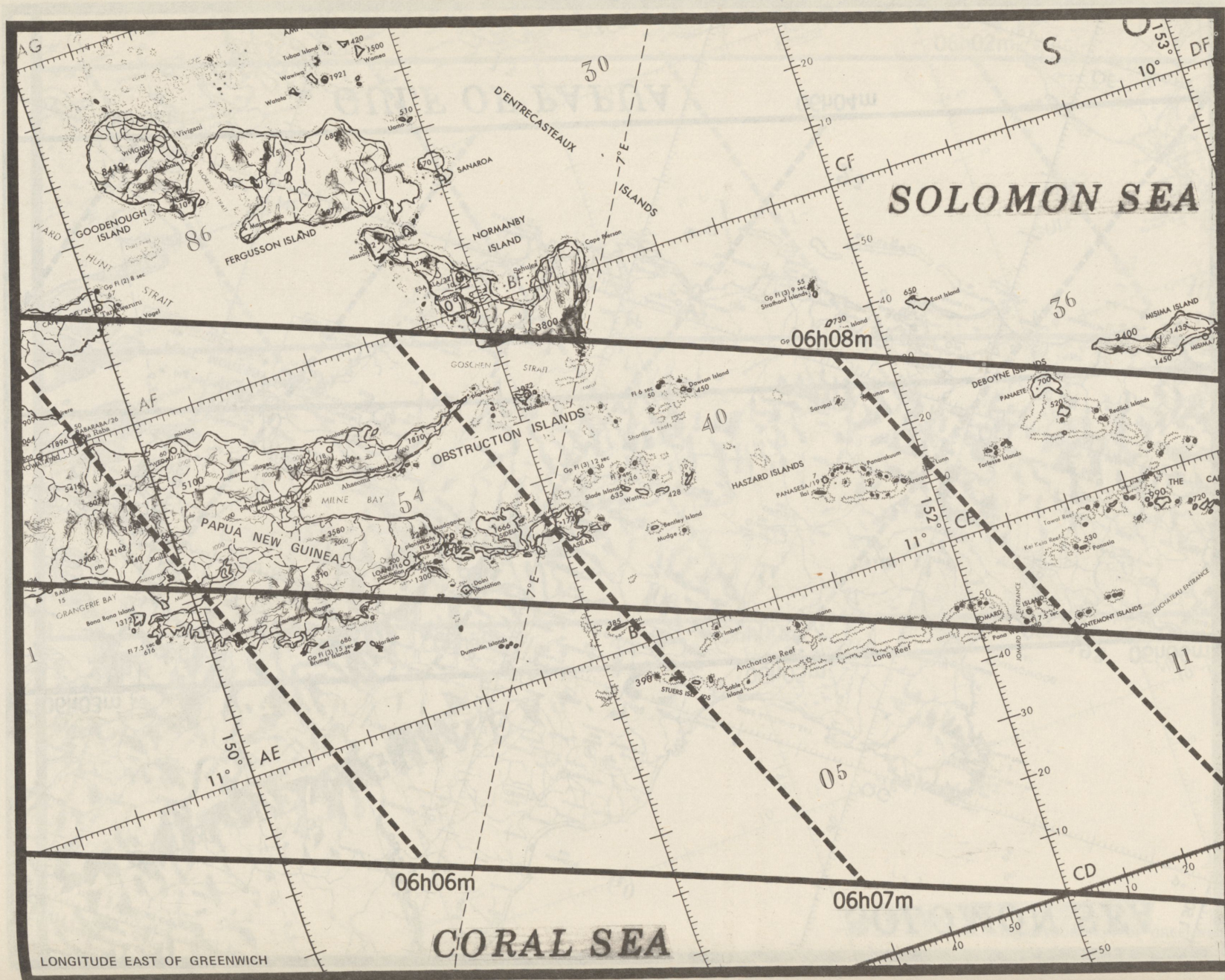


TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

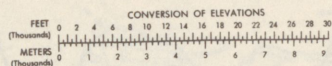




TOTAL SOLAR ECLIPSE OF 11 JUNE 1983



ELEVATIONS IN FEET



MAXIMUM TERRAIN ELEVATIONS

Maximum Terrain elevation figures centered in the area bounded by ticked lines of LATITUDE and LONGITUDE, are represented in THOUSANDS and HUNDREDS of feet, BUT DO NOT INCLUDE ELEVATIONS OF VERTICAL OBSTRUCTIONS.

3100 feet **31**

ATTENTION
THIS CHART CONTAINS MAXIMUM
ELEVATION FIGURES (MEF)

The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. The MEF is based on information available concerning the highest known feature in each quadrangle, including terrain and obstructions (trees, towers, antennas, etc.)

Example: 12,500 feet **12⁵**

CULTURE

- Actual city outline..... Towns and villages (outline unknown)..... □
- Land mark features (unillustrated)..... Dual lane roads.....
- Primary roads..... Secondary roads.....
- Tracks and trails..... Multiple track R.R.
- Single track R.R. Power transmission line.....

VEGETATION

To assure legibility of significant relief, vegetation patterns are shown in relatively level areas only.

Vegetation

AERONAUTICAL INFORMATION

- Major aerodromes..... J EDNA 920
Runway pattern and 6000 foot diameter circle is shown at 1:500,000 scale. Center of circle represents true position of airfield.
- Major aerodromes, runway pattern not available..... ○
- Minor aerodromes..... ○
- Seaplane base..... ④
- Jet facilities available..... J

Major aerodromes portrayed have a hard surface runway length of 3000 feet or more. When runway pattern is not shown, number following the name indicates length of longest runway to nearest hundreds of feet. Aerodrome elevations are in feet above sea level.

OBSTRUCTIONS

- Vertical obstructions..... 1850 (1250)
- Highest vertical obstruction (above MSL) within ticked lines of latitude and longitude..... 1850 (1250)
- Multiple obstructions..... 920 (230)
- Vertical obstructions with landmark significance..... 920 (230)

Numbers adjacent to obstruction indicate elevation of top of obstruction above mean sea level (MSL). Numerals in parentheses indicate height above ground level (AGL). Vertical obstructions under 200 feet in height (AGL) are not shown.

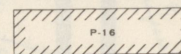
RADIO AIDS TO NAVIGATION

- VHF OMNI RANGE (VOR)
- ✶ VORTAC
- ✶ TACAN
- ✶ VOR with DME
- Other Facilities

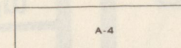
WARNING

Aircraft infringing upon Non-Free Flying Territory may be fired on without warning. Consult NOTAMS and Flight Information Publications for the latest air information.

SPECIAL USE AIRSPACE



PROHIBITED AREAS



ALERT, CAUTION, DANGER
RESTRICTED OR WARNING AREA

NUMBERS INDICATE INTERNATIONALLY
RECOGNIZED NUMERICAL
IDENTIFICATION

BUFFER ZONE



CONTOUR INTERVAL

- 1000 feet
Intermediate contour shown at 500 feet
Auxiliary Contour shown at 250 and 750 foot intervals
- 1000 500 250 750
- Basic Intermediate Auxiliary
- Dashed contours indicate approximate relief

CONTOURS

(Accuracy based on Mean Sea Level)
Accurate to within 500 feet.

SPOT ELEVATIONS

(Accuracy based on Mean Sea Level)

- Maximum Vertical error 100 feet..... 0.000
- Maximum Vertical error 400 feet..... 0.000
- Approximate or doubtful location..... 0.000
- Vertical error same as contours..... 0.000
- Critical elevation..... 0.000
- Lake and Stream elevation..... 0.000

GLOSSARY

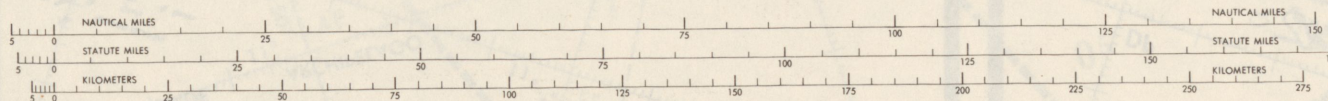
Batu	Mountain
Bukit	Mountain
Danau	Lake
Gunung	Mountain
Kali	River
Kepulauan	Mountains
Laut	Sea
Nusa	Island
Pegunungan	Mountain range
Pulau	Island
Rawa	Flooded area
Selat	Strait, Channel
Teluk	Bay, Gulf
Tanjung	Point, Cape
Ujung	Point, Cape

NOTES

This chart is not an authority for international boundaries.

Power transmission line information on this chart is incomplete.

Geographic names or their spellings do not necessarily reflect recognition of the political status of an area by the United States Government.



OPERATIONAL NAVIGATION CHART

1:1,000,000

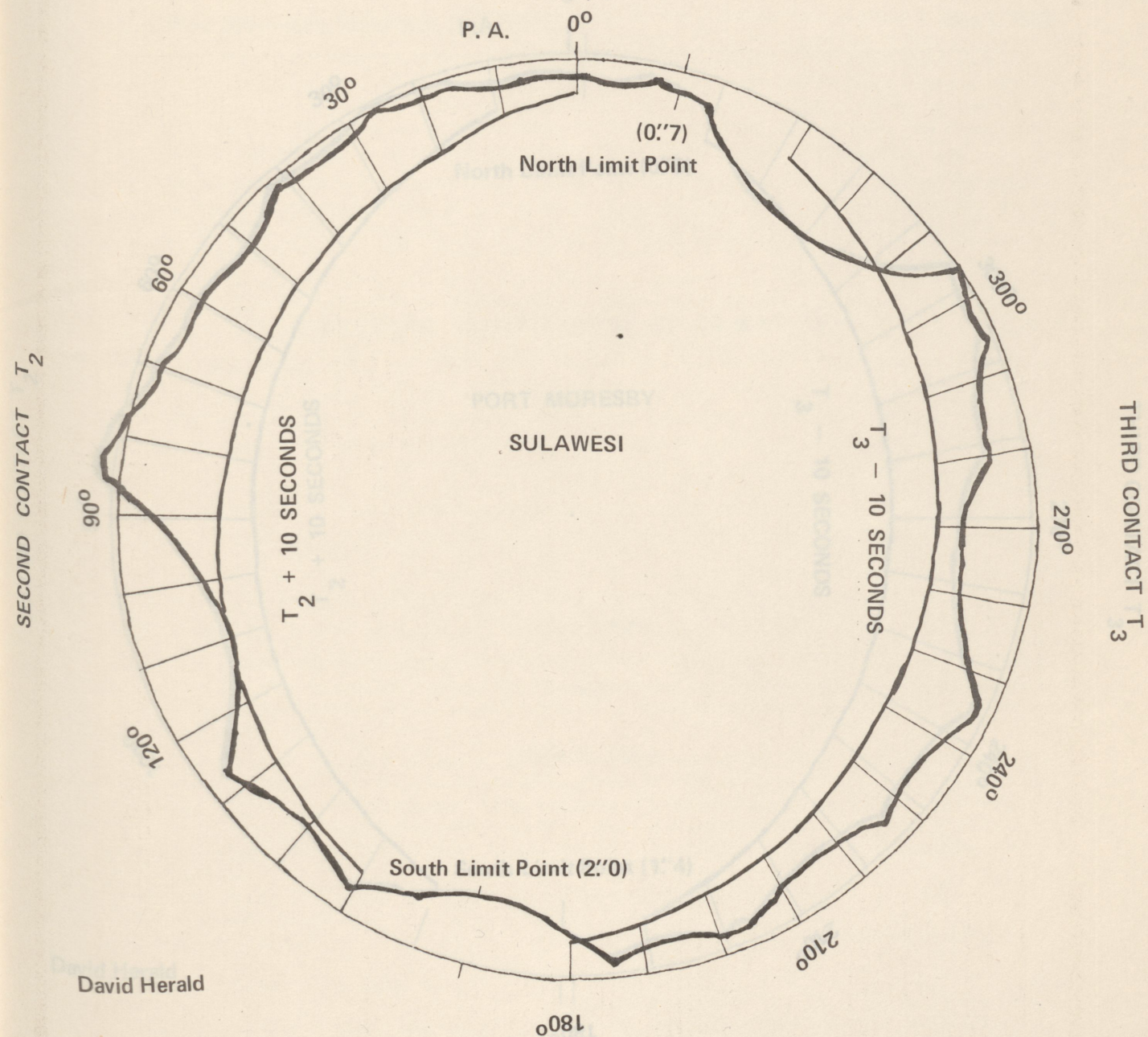
Civil users may purchase DMAAC products by ordering them from the following address:

Distribution Division (C-44)
National Ocean Survey.
Riverdale, MD. 20840

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

45.

LIMB CORRECTION CHART



THE UNIVERSITY OF CHICAGO PRESS

CHICAGO, ILLINOIS

TOTAL SOLAR ECLIPSE OF 11 JUNE 1983

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LIMB CORRECTION CHART

UNITED STATES NAVAL OBSERVATORY

SOLAR ECLIPSE

U. S. Naval Observatory, Washington

P.A.

May 1, 1983

